U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-265 645

Finger - Fill Canal Studies Florida and North Carolina

Environmental Protection Agency, Athens, Ga

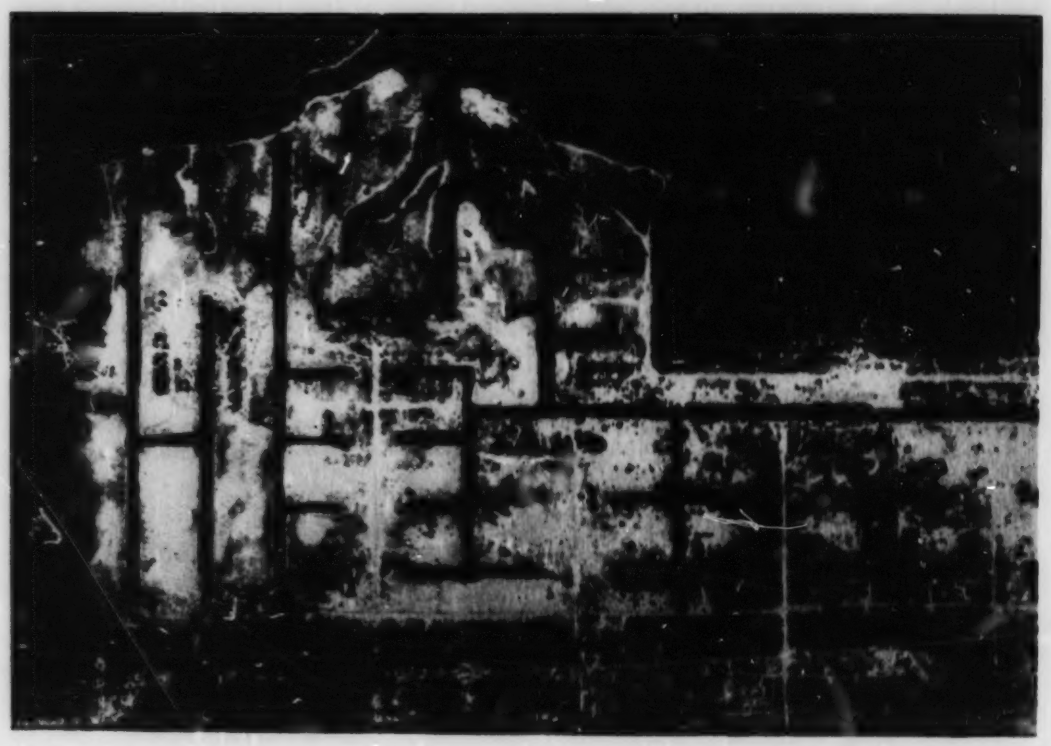
May 75

PB 265 645

EPA 904/9-76-017

FINGER-FILL CANAL STUDIES FLORIDA AND NORTH CAROLINA

MAY 1975



REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
SURVEILLANCE AND ANALYSIS DIVISION
COLLEGE STATION ROAD
ATHENS, GEORGIA 30601

BIBLIOGRAPHIC DATA SHEET

1. Report No. EPA/904/9-76/017

2.

3. Recipient's Accession No. PB-265 645

4. Title and Subtitle
Finger - Fill Canal Studies, Florida and North Carolina.

5. Report Date May 75

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Environmental Protection Agency, Athens, Fa.
Surveillance and Analysis Div.

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstracts

This report presents the findings and interpretations of data collected from the study of finger-fill canals in Charlotte, Monroe and Bay Counties, Florida and in Carteret County, North Carolina. Field investigations were conducted to:

Characterize water chemistry, sediment chemistry and viological aspects of existing finger fill canals; compar canal conditions of various sizes, ages and stages of residential development; determine flushing rates of various canal configurations; quantify and quality the mass exchange of nutrients between canals and receiving waters; verify the presence of septic tank/sorbtion field leachates in canals from development, and verify by field measured tracers the application of predictive mathematical models.

The information contained in this report should provide supporting data for future assessments of water quality effects of finger-fill canal developments.

17. Key Words and Document Analysis. 17a. Descriptors

*Canals,
*Sediments,
*Aquatic biology,
*Water pollution,

Surveys,
Concentration(Composition),
Nutrients,
Land use,
Mathematical models,
Size determination,
Graphs(Charts),
Tables(Data),
Septic tanks,
Residential buildings,
Flushing,
Mass flow,
Florida,
North Carolina.

17b. Identifiers/Open-Ended Terms

*Water quality data,
Charlotte County(Florida),
Monroe County(Florida),
Bay County(Florida),
Carteret County(North Carolina).

17c. COSATI Field/Group 13B

18. Availability Statement
National Technical Information Service
Springfield, Virginia 22161

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page) UNCLASSIFIED

21. No. of Pages 446p

22. Price PC A19/MF A01

FINGER - FILL CANAL STUDIES
FLORIDA and NORTH CAROLINA

May 1975

U. S. Environmental Protection Agency
Surveillance and Analysis Division
Athens, Georgia

i(a)

FOREWORD

The Environmental Protection Agency is committed to an aggressive program of both water quality and wetland protection. Maintaining wetland integrity is a principal consideration in EPA's review of the planning and potential construction in coastal areas. This document reports the experience of EPA, Region IV, regarding the physical, chemical, and biological conditions associated with several existing coastal waterway developments. In this report environmental baseline data are presented for consideration in the planning and construction of canal systems in the southeast region of the United States.

In no respect is this information intended to relieve developers of their obligation to abide by, nor to avoid conflict with, regulations of local, state, other federal agencies, or any regulations to be subsequently promulgated by the U.S. Environmental Protection Agency. This report is not intended to discourage innovative design; however, the suggestions contained in this report, if implemented, would be a positive step in reducing water quality deterioration in canal systems.

Adherence to the suggestions contained in this report does not constitute endorsement or recommendation of any project in itself.

The planning and operation of these studies were carried out under the supervision of J. A. Little, Director, Surveillance and Analysis Division located in Athens, Georgia.

Principal authors were D. B. Hicks and T. R. Cavinder, Aquatic Biologist and Sanitary Engineer, respectively.

Other contributing authors were: B. J. Carroll, R. L. Raschke and P. M. Murphy, Microbiologist and Aquatic Biologists, respectively.

TABLE OF CONTENTS

Page

LIST OF TABLES.. iii

LIST OF FIGURES... vi

I. INTRODUCTION.. 1

II. SUMMARY.. 2
  A. WATER QUALITY.. 2
  B. SEDIMENTS.. 2
  C. MICROBIOLOGY... 2
  D. CANAL FLUSHING AND MODELING.......................... 2
  E. SEPTIC TANKS... 3
  F. BIOLOGY.. 3

III. RECOMMENDATIONS... 5

IV. DISCUSSION... 7
  A. CANAL DEPTHS... 7
  B. SEPTIC TANKS... 9

V. BACKGROUND.. 13

VI. STUDY AREAS.. 16
  A. PUNTA GORDA, FLORIDA................................. 16
  B. BIG PINE KEY, FLORIDA................................ 16
  C. MARATHON, FLORIDA.................................... 17
  D. ATLANTIC BEACH, NORTH CAROLINA....................... 17
  E. PANAMA CITY, FLORIDA................................. 18

VII. STUDY RESULTS... 26
  A. TIDAL EXCHANGE STUDY................................. 26
    1. Dispersion.. 26
    2. Tidal Flushing.................................... 30
  B. WATER QUALITY STUDIES................................ 52
    1. Salinity Temperatures and Dissolved Oxygen.... 53
    2. Biochemical Oxygen Demand......................... 57
    3. Total Organic Carbon.............................. 58
    4. Nitrogen and Phosphorus........................... 61
    5. Sulfides.. 64
    6. Metals.. 64
    7. Bacteriological................................... 65

Page

C. MASS EXCHANGE STUDY 130
D. SEDIMENTS 135
   1. Carbon and Nitrogen Ratio 136
   2. Metals 142
   3. Pesticides 142
   4. Development Density Versus Sediment Composition 142
E. SEPTIC TANK LEACHATE TRACING STUDIES 159
F. SYNOPTIC REVIEW OF THE ADVERSE ENVIRONMENTAL EFFECTS OF SEPTIC TANKS 172
G. BIOLOGY 187
   1. Benthic Macroinvertebrates 187
   2. Macrophytes 190
   3. Periphyton 192
   4. Phytoplankton Chlorophyll A 195
H. MATHEMATICAL MODELING 207
   1. Models 207
   2. Model Background 207
   3. Simulations 209

VIII. REFERENCES 226

IX. APPENDICES 233

LIST OF TABLES

Number		Page
I	Points of dye injection for tidal exchange studies at Punta Gorda and Big Pine Key, Florida and Atlantic Beach, North Carolina	27
II	Longitudinal dispersion coefficients for tidal exchange studies at Punta Gorda, Big Pine Key, and Atlantic Beach	29
III	Longitudinal dispersion coefficients from other studies	30
IV	Comparison of canal flushing rates by least square analysis	31
V	Canal flushing times based on dye tracer and tidal prism computations	32
VI	Canal locations and sampling sites for water quality studies in Florida and North Carolina	52
VII	Average concentrations for water quality parameters at Punta Gorda, Florida, November 1973	67
VIII	Average concentrations for water quality parameters at Big Pine Key, Florida, November 1973	68
IX	Average concentrations for water quality parameters at Punta Gorda, Florida, August 1974	69
X	Average concentrations for water quality parameters at Big Pine Key, Florida, August 1974	70
XI	Average concentrations for water quality parameters at Marathon, Florida, August 1974	71
XII	Average concentrations for water quality parameters at Panama City, Florida, September 1974	72
XIII	Average concentrations for water quality parameters at Atlantic Beach, North Carolina, September 1974	73
XIV	Average concentrations for water quality parameters at Spooners Creek, North Carolina, September 1974	74

LIST OF TABLES (continued)

Number		Page
XV	Average concentrations for water quality parameters at Emerald Isle, North Carolina, September 1974	75
XVI	Diurnal changes in vertical profile for dissolved oxygen at canal station G at Big Pine Key, Florida, November 1973	76
XVII	Dissolved oxygen concentrations relative to depth at dead end canal stations at Big Pine Key, November 1973	77
XVIII	Concentrations of organic carbon, nitrogen, and phosphorus in canals at Punta Gorda, Florida, August 1974	78
XIX	Seasonal changes in benthic plant biomass and total organic carbon concentrations at Big Pine Key, Florida, November 1973 and August 1974	79
XX	Nutrient and dissolved oxygen concentrations relative to canal depth and stage of development at Atlantic Beach, North Carolina, September 1974	80
XXI	Numbers of coliform bacteria found in study canals	81
XXII	Tidal exchange of nutrients in Florida and North Carolina canals, August and September 1974	133
XXIII	Net nutrient exchange over 24-hour tidal cycle in Florida and North Carolina canals, August and September 1974	134
XXIV	Average concentrations of chemical parameters in canal sediments, Punta Gorda, Florida, November 1973	144
XXV	Average concentration of chemical parameters in canal sediments at Panama City, Atlantic Beach, and Spooners Creek, September 1974	145
XXVI	Organic carbon to nitrogen ratios for canal sediments at Punta Gorda and Big Pine Key, Florida, November 1973	146
XXVII	Organic carbon to nitrogen ratios for canal sediments at Marathon, Florida, August 1974	147

LIST OF TABLES (continued)

Number		Page
XXVIII	Organic carbon to nitrogen ratios for canal sediments at Atlantic Beach and Spooners Creek, North Carolina, September 1974	148
XXIX	Chemical character of sediments relative to degree of canal development	149
XXX	Ground water wells at Surf City, North Carolina, February 1975	163
XXXI	Typical process effluent characteristics	180
XXXII	General septic tank installation criteria	181
XXXIII	Incidence of waterborne disease in the United States, 1946 to 1970	182
XXXIV	Distance of travel of fecal microorganisms	183
XXXV	Summary of distance of travel of pollution	184
XXXVI	Time of survival of fecal bacteria	186
XXXVII	Benthic macrophyte biomass at Big Pine Key, Florida, November 1973	197
XXXVIII	Benthic macrophyte biomass at Big Pine Key, Florida, August 1974	198
XXXIX	Phytoplankton chlorophyll a concentrations at Big Pine Key, Florida, August 1974	199
XL	Tidal dispersion constants	209
XLI	Typical dissolved oxygen concentrations under simulated conditions of waste loading	212
XLII	Typical dissolved oxygen concentrations under simulated conditions of waste loading	212

LIST OF FIGURES

Number		Page
1	Vertical stratification of salinity, dissolved oxygen, and nutrients in Canal II at Punta Gorda, Florida, August 5, 1974.	10
2	Average dissolved oxygen concentrations as related to canal depths, North Carolina, September 1974.	11
3	Average dissolved oxygen concentrations as related to canal depths, Florida, August 1974	12
4	Study area and canal locations at Punta Gorda, Florida	19
5	Study area at Big Pine Key, Florida	20
6	Canal location at Big Pine Key, Florida	21
7	Study area and canal location at Marathon, Florida	22
8	Study area at North Carolina	23
9	Canal locations at Atlantic Beach, North Carolina	24
10	Study area and canal location at Panama City, Florida	25
11	Canal locations for dye tracer studies at Punta Gorda, Florida	34
12	Canal locations for dye tracer studies at Big Pine Key, Florida	35
13	Canal locations for dye tracer studies at Atlantic Beach, North Carolina	36
14	Tidal recording at Punta Gorda, Florida, November 1973.	37
15	Tidal recording at Big Pine Key, Florida, November 1973	38
16	Tidal recording at Atlantic Beach, North Carolina, September 1974	39
17	Dimensions of study canals at Punta Gorda, Florida	40

LIST OF FIGURES (continued)

Number		Page
18	Dimensions of study canals at Big Pine Key, Florida	41
19	Dimensions of study canals at Atlantic Beach, North Carolina	42
20	Dye concentration curves for Canal I at Punta Gorda, Florida	43
21	Dye concentration curves for Canal II at Punta Gorda, Florida	44
22	Dye concentration curves for Canal III at Big Pine Key, Florida	45
23	Dye concentration curves for Canal IV at Big Pine Key, Florida	46
24	Dye concentration curves for Canal V at Big Pine Key, Florida	47
25	Dye concentration curves for Canal VI at Atlantic Beach, North Carolina	48
26	Dye concentration curves for Canal VII at Atlantic Beach, North Carolina	49
27	Time history curves for dye concentrations at different canal points at Punta Gorda, Florida	50
28	Canal flushing curves derived from dye tracer studies at Punta Gorda and Big Pine Key, Florida	51
29	Sampling site location for water quality studies at Punta Gorda, Florida, November 1973 and August 1974	82
30	Sampling site location for water quality studies at Big Pine Key, Florida, November 1973 and August 1974	83
31	Sampling site location for water quality studies at Marathon, Florida, August 1974	84
32	Sampling site location for water quality studies at Panama City, Florida 1974	85

LIST OF FIGURES (continued)

Number		Page
33	Sampling site location for water quality studies at Atlantic Beach, North Carolina, September 1974	86
34	Sampling site location for water quality at Spooners Creek, North Carolina, September 1974	87
35	Study location for water quality investigations at North Carolina, September 1974	88
36	Dissolved oxygen, salinity, and temperature profiles for canal stations 1 and 2 at Punta Gorda, Florida, November 1973	89
37	Dissolved oxygen, salinity, and temperature profiles for canal stations 3 and 4 at Punta Gorda, Florida, November 1973	90
38	Dissolved oxygen, salinity, and temperature profiles for canal stations 5 and 6 at Punta Gorda, Florida, November 1973	91
39	Dissolved oxygen, salinity, and temperature profiles for canal station 7 at Punta Gorda, Florida, November 1973	92
40	Dissolved oxygen, salinity, and temperature profiles for canal stations 8 and 9 at Big Pine Key, Florida, November 1973	93
41	Dissolved oxygen, salinity, and temperature profiles for canal stations 10 and 11 at Big Pine Key, Florida, November 1973	94
42	Dissolved oxygen, salinity, and temperature profiles for canal stations 12 and 13 at Big Pine Key, Florida, November 1973	95
43	Dissolved oxygen, salinity, and temperature profiles for canal stations 14 and F at Big Pine Key, Florida, November 1973	96
44	Dissolved oxygen, salinity, and temperature profiles for canal station G at Big Pine Key, Florida, November 1973	97

LIST OF FIGURES (continued)

Number		Page
45	Diel changes in dissolved oxygen concentrations for Canal I at Punta Gorda, Florida, November 1973	98
46	Diel changes in dissolved oxygen concentrations for Canal II at Punta Gorda, Florida, November 1973	99
47	Dissolved oxygen, salinity, and temperature profiles for canal stations A and B at Punta Gorda, Florida, November 1973	100
48	Dissolved oxygen, salinity, and temperature profiles for canal stations C and D at Punta Gorda, Florida, November 1973	101
49	Dissolved oxygen, salinity, and temperature profiles for canal station E at Punta Gorda, Florida, November 1973	102
50	Diel changes in dissolved oxygen concentrations for Canal III at Big Pine Key, Florida, November 1973	103
51	Diel changes in dissolved oxygen concentrations for Canal IV at Big Pine Key, Florida, November 1973	104
52	Dissolved oxygen, salinity, and temperature profiles for canal stations 1 and 2 at Punta Gorda, Florida, August 1974	105
53	Dissolved oxygen, salinity, and temperature profiles for canal stations 3 and 4 at Punta Gorda, Florida, August 1974	106
54	Dissolved oxygen, salinity, and temperature profiles for canal stations 5 and 6 at Punta Gorda, Florida, August 1974	107
55	Dissolved oxygen, salinity, and temperature profiles for canal station 7 at Punta Gorda, Florida, August 1974	108
56	Dissolved oxygen, salinity, and temperature profiles for canal stations 8 and 9 at Big Pine Key, Florida, August 1974	109

LIST OF FIGURES (continued)

Number		Page
57	Dissolved oxygen, salinity, and temperature profiles for canal stations 10 and 11 at Big Pine Key, Florida, August 1974	110
58	Dissolved oxygen, salinity, and temperature profiles for canal stations 12 and 13 at Big Pine Key, Florida, August 1974	111
59	Dissolved oxygen, salinity, and temperature profiles for canal stations 14 and F at Big Pine Key, Florida, August 1974	112
60	Dissolved oxygen, salinity, and temperature profiles for canal station G at Big Pine Key, Florida, August 1974	113
61	Dissolved oxygen, salinity, and temperature profiles for canal stations 15 and 16 at Marathon, Florida, August 1974	114
62	Dissolved oxygen, salinity, and temperature profiles for canal stations 17 and 18 at Marathon, Florida, August 1974	115
63	Dissolved oxygen, salinity, and temperature profiles for canal station 19 at Marathon, Florida, August 1974	116
64	Dissolved oxygen, salinity, and temperature profiles for canal stations 1 and 2 at Atlantic Beach, North Carolina, September 1974	117
65	Dissolved oxygen, salinity, and temperature profiles for canal stations 3 and 4 at Atlantic Beach, North Carolina, September 1974	118
66	Dissolved oxygen, salinity, and temperature profiles for canal stations 5 and 6 at Atlantic Beach, North Carolina, September 1974	119
67	Dissolved oxygen, salinity, and temperature profiles for canal stations 7 and 8 at Atlantic Beach, North Carolina, September 1974	120

LIST OF FIGURES (continued)

Number		Page
68	Dissolved oxygen, salinity, and temperature profiles for canal stations 9 and 10 at Atlantic Beach, North Carolina, September 1974	121
69	Housing density on study canals at Atlantic Beach, North Carolina, September 1974	122
70	Dissolved oxygen, salinity, and temperature profiles for canal stations 1 and 2 at Spooners Creek, North Carolina, September 1974	123
71	Dissolved oxygen, salinity, and temperature profiles for canal stations 3 and 4 at Spooners Creek, North Carolina, September 1974	124
72	Dissolved oxygen, salinity, and temperature profiles for canal stations 5 and 6 at Spooners Creek, North Carolina, September 1974	125
73	Total phosphorus and nitrogen concentrations in canals at Punta Gorda, Florida, November 1973	126
74	Total phosphorus and nitrogen concentrations in canals at Punta Gorda, Florida, August 1974	127
75	Total phosphorus and nitrogen concentrations in canals at Big Pine Key, Florida, November 1973	128
76	Total phosphorus and nitrogen concentrations in canals at Big Pine Key, Florida, August 1974	129
77	Vertical and longitudinal distribution of organic matter in canal sediments at Punta Gorda, Florida, November 1973	150
78	Vertical and longitudinal distribution of organic matter in canal sediments at Punta Gorda, Florida, November 1973	151
79	Vertical and longitudinal distribution of organic matter in canal sediments at Big Pine Key, Florida, November 1973	152
80	Vertical and longitudinal distribution of organic matter in canal sediments at Big Pine Key, Florida, November 1973	153

LIST OF FIGURES (continued)

Number Page

81 Vertical and longitudinal distribution of organic matter in canal sediments at Marathon, Florida, September 1974 154

82 Vertical and longitudinal distribution of organic matter in canal sediments at Atlantic Beach, North Carolina, September 1974 155

83 Vertical and longitudinal distribution of organic matter in canal sediments at Atlantic Beach, North Carolina, September 1974 156

84 Hypothesized dissolved oxygen profile relative to canal depth. 157

85 Metal accumulations in canal sediments at Punta Gorda, Florida, November 1973 158

86 Study location and canal site for septic tank leachate tracing investigation at Punta Gorda, August 1974 164

87 Study location and canal site for septic tank leachate tracing investigation at Big Pine Key, Florida, August 1974 165

88 Study location and canal site for septic tank leachate tracing investigation at Atlantic Beach, North Carolina, September 1974 166

89 Time history graph for dye transmission from septic tank to canal at Punta Gorda, Florida, August 1974 167

90 Time history graph for dye transmission from septic tank to canal at Atlantic Beach, North Carolina, September 1974 168

91 Time history graph for dye transmission from septic tank to canal at Atlantic Beach, North Carolina, September 1974 169

92 Location of ground water wells at Surf City, North Carolina, February 1975 170

LIST OF FIGURES (continued)

Number		Page
93	Location of ground water wells at Surf City, North Carolina, February 1975	171
94	Benthic macrophyte biomass at Big Pine Key, Florida, November 1973	200
95	Benthic macrophyte biomass at Big Pine Key, Florida, August 1974	201
96	Periphyton chlorophyll a concentrations for Canal II at Punta Gorda, Florida, November 1973	202
97	Periphyton chlorophyll a concentration for Canal I at Punta Gorda, Florida, November 1973	203
98	Periphyton autotrophic index for Canal I at Punta Gorda, Florida, November 1973	204
99	Periphyton autotrophic index for Canal II at Punta Gorda, Florida, November 1973	205
100	Phytoplankton chlorophyll a concentrations at Big Pine Key and Punta Gorda, Florida, November 1973	206
101	Study location and canal site for the dye tracer studies at Punta Gorda, Florida, November 1973	214
102	Study locations and canal site for the dye tracer investigation at Big Pine Key, Florida, November 1973	215
103	Study location and canal site for the dye tracer investigation at Atlantic Beach, North Carolina, September 1974	216
104	Photochemical decay curve for Rhodamine WT at Atlantic Beach, North Carolina, September 1974	217
105	Computed and observed dye concentrations in Canal II at Punta Gorda, Florida, November 1973	218
106	Computed and observed dye concentrations in Canal V at Big Pine Key, Florida, November 1973	219
107	Computed and observed dye concentrations in Canal VI at Atlantic Beach, North Carolina, September 1974	220

LIST OF FIGURES (continued)

Number		Page
108	Computed and observed dye concentrations in Canal VII at Atlantic Beach, North Carolina, September 1974	221
109	Simulated canal flushing times using modeling technique	222
110	Dissolved oxygen suppressions as related to waste loading for Canal II at Punta Gorda, Florida, November 1973	223
111	Dissolved oxygen suppressions as related to waste loading for Canal V at Big Pine Key, Florida, November 1973	224
112	Simulated flushing times for Canal V at Big Pine Key, Florida, November 1973	225

I. INTRODUCTION

This report presents the findings and interpretations of data collected from the study of finger-fill canals in Charlotte, Monroe and Bay Counties, Florida and in Carteret County, North Carolina. Field investigations were conducted by personnel of the Surveillance and Analysis Division, Region IV, U. S. Environmental Protection Agency during November 1973 and August-September 1974. The study was designed to:

- Characterize water chemistry, sediment chemistry and biological aspects of existing finger fill canals;
- Compare canal conditions of various sizes, ages and stages of residential development;
- Determine flushing rates of various canal configurations;
- Quantify and qualify the mass exchange of nutrients between canals and receiving waters;
- Verify the presence of septic tank/sorbtion field leachates in canals from development, and
- Verify by field measured tracers the application of predictive mathematical models.

Although no attempt was made to assess the environmental damages of dredge and fill operations associated with these developments, the information contained in this report should provide supporting data for future assessments of water quality effects of finger-fill canal developments.

The cooperation, assistance and laboratory space provided by personnel of the Florida Department of Pollution Control, North Carolina Departments of Natural and Economic Resources and Human Resources, and Key Deer National Park are greatly appreciated.

In preparing this final report, a Finger-Fill Canal Seminar was held in Atlanta, Georgia, May, 1975. Written and oral suggestions received aided in the preparation of this document and were greatly appreciated.

We also greatly appreciate the assistance provided by the Surveillance and Analysis Division staff in preparing this report.

II. SUMMARY

A - WATER QUALITY

Poor flushing, coupled with seasonal inflow of fresh water, produced extensive salinity stratification in canal systems surveyed in southwestern Florida. A bottom layering of high salinity water resulted in stagnation, putrification, and excessive nutrient enrichment of the water column. Destratification was realized with seasonally diminished inputs of fresh water.

State established water quality standards and associated criteria provide the basis of assessing water quality violations. Violations of dissolved oxygen criteria were documented for all canal systems surveyed in both Florida and North Carolina. These violations were demonstrated to occur in those canals whose depths exceeded four to five feet.

Total nitrogen and organic carbon were the most salient chemical constituents characterizing water quality differences between developed and undeveloped canal systems. In nearly every case, concentrations of these constituents were greater in the developed waterways. Equally evident was that their concentrations varied inversely with averaged dissolved oxygen concentrations.

B - SEDIMENTS

Canal sediments examined during the study featured an accumulation of organic carbon and nitrogen that were maximized with increasing distances from the mouths of the canals. The reported carbon:nitrogen ratios of canal sediments were low and indicated that most canal sediments were fairly well stabilized with respect to microbial decomposition. Relative stages of development (dwelling unit density) along canal banks were positively correlated to general sediment composition. The greater the dwelling unit density, the greater the nutrient concentration in the sediment.

C - MICROBIOLOGY

Total coliform bacteria densities exceeded allowable water quality criteria associated with applicable standards at all canal study areas, with the exception of the Big Pine Key site. No standard violations were noted at any of the background stations nor at undeveloped canal sites. As a rule, total coliform densities increased from the mouth to the dead end of all the developed canals. Dead-end stations had fecal coliform densities which exceeded their respective background stations by: 43 percent at Punta Gorda; 1,200 percent at Big Pine Key; 33,000 percent at Panama City (Woodlawn Canal); 50 percent at Panama City (Hentz Canal); 37,000 percent at Atlantic Beach; and 3,500 percent at Spooners Creek.

D - CANAL FLUSHING AND MODELING

In general, the dispersive properties of natural bay-estuarine systems were two orders of magnitude greater than those canal systems investigated. A measure of dispersive properties of estuaries and canals included in these investigations indicated the following dispersion coefficients:

	$\text{Miles}^2/\text{Day}$
Waccasassa Estuary - Cedar Key, Florida 1/	2.0-2.7
Hillsboro Bay - Tampa, Florida 1/	0.7-6.0
Canal I - Punta Gorda, Florida	0.006
Canal II - Punta Gorda, Florida	0.003
Canal III - Big Pine Key, Florida	0.002
Canal IV - Big Pine Key, Florida	0.001
Canal V - Big Pine Key, Florida	0.003
Canal VI - Atlantic Beach, North Carolina	0.007
Canal VII - Atlantic Beach, North Carolina	0.011

1/ Measured by others.

Flushing of canals to the 90-percent level required from 70 to 250 hours in the systems investigated.

Based upon mathematical model simulations, the canal systems studied did not have the assimilative capacity to receive wastewater effluent.

Flushing times were found to be responsive to both canal depth and length. Computer simulations demonstrated that depth is the dominant factor affecting flushing. Consequently, if flushing times and assimilative capacity are to be maximized, canal depths and, to a lesser extent, lengths must be minimized.

E - SEPTIC TANKS

Considerable documentation exists in the literature of chemical, bacterial, and viral contaminants from septic tank leachates traveling significant distances in ground water systems. Confirmed illnesses resulting from the consumption of ground water contaminated by septic tank leachates emphasize the public health implications where lateral movement of ground water occurs. Similarly, documentation exists demonstrating movement of septic tank leachates through ground waters to estuarine waters.

With the exception of the Big Pine Key studies, tracer dyes introduced into septic tank systems located approximately 50 feet from finger canals demonstrated that septic tank leachates were rapidly transmitted to the adjacent canal waters. At Punta Gorda, dye was detected in the canal system 25 hours after injection into a septic tank system. At Atlantic Beach, dye was confirmed in two canal systems four and sixty hours after injection into septic tank systems.

F - BIOLOGICAL

Except for shallow shoreline habitat, physical and chemical conditions of the bottom in the Punta Gorda canal system severely limited the kinds and numbers of bottom-dwelling organisms. During the wet season, the canal systems featured salinity stratification with an anoxic benthic environment.

Bottom sediments were unconsolidated, rich in organic matter, and often laden with sulfides.

Excessive turbidity, unconsolidated substrate, and lack of dissolved oxygen precluded the survival of attached benthic macrophytes. Phytoplanktonic chlorophyll values for the Punta Gorda canals were comparable to levels found in most inshore regions of the Gulf of Mexico. The growth of algae on artificial substrates was more luxurious in the developed canal. Inorganic nutrients did not appear to be a factor limiting periphytic growth.

At Big Pine Key, both the developed and undeveloped canals supported a benthic environment suitable for numerous kinds of macroinvertebrates. Diversity and numerical abundance were keyed to the abundance of benthic attached plants. Bottom sediments appeared to have a low level of organic matter and were comprised mainly of clay and silt. Seagrasses and attached algae were common to all canals in the study. Their abundance was sufficient to effect a marked day-night variation in dissolved oxygen. Seasonal variations in standing crop biomass were maximized in the developed canal with seasonal lows appearing premature for benthic plant communities. The undeveloped canal supported a plant community yielding only slight seasonal changes in standing crop biomass. Phytoplanktonic chlorophyll values were significantly greater in the developed canal with chlorophyll values being maximized when benthic macrophytes were reduced in standing crop biomass.

The Sea-Air Estate canal system at Marathon, Florida, featured sediments comprised mainly of silt and clay with organic content similar to the Big Pine Key canals. Macrophytes and macroalgae were virtually excluded from the bottom community. Low dissolved oxygen concentrations were common to the bottom environment.

A community comprised of few benthic macroinvertebrates was found in the Atlantic Beach canals. Dead-end and mid-canal regions were void of a benthic macroinvertebrate community. Sediments in these regions were excessively enriched with organic matter and unconsolidated. Low dissolved oxygen concentrations were common to the benthic habitat.

III. RECOMMENDATIONS

1. Coastal canal developments should be restricted to non-wetland areas. Access canals should be routed from housing developments to the parent body of water by the shortest and least environmentally damaging course.
2. During the planning phase of a coastal canal development, a hydrologic investigation should be made to determine the presence of, and project effect on, shallow aquifers. In addition, with consideration of surrounding hydrologic features, circulation patterns of the proposed canal system should be described.
3. As part of the permitting process, the party responsible for maintenance of water quality standards and/or correction of water quality violations in coastal canal developments should be designated.
4. Canal depths should not be governed by fill requirements. An appropriate canal depth for shallow draft pleasure craft should be no more than four to six feet below mean low water.
5. Centralized waste collection and treatment systems are necessary in coastal canal housing developments.
6. No sewage treatment plant effluent or other point-source discharges should be discharged directly into finger-fill canal waters. Discharges into surface waters should be sufficiently distant from the canals to ensure that the effluent is not carried into the canal systems by tidal currents.
7. Surface drainage patterns should be designed with swales to minimize direct runoff into canal waterways.

8. The grade of canal bottoms should be such that no sills are created at any point in the system, especially at the confluence with the parent water body.
9. Orientation of canals should take into account prevailing wind direction so that flushing/mixing would be enhanced and wind drift of floating debris minimized.
10. To the extent possible, dead-end features should be eliminated from canal system design.

Since the studies discussed in this report were completed, EPA Region IV has initiated additional studies to evaluate the physical, chemical, and biological aspects associated with dead-end canals featuring maximum depths of 4-6 feet MLW. Preliminary analysis of these study results indicate the above recommendations remain appropriate.

IV. RATIONALE FOR RESTRICTING CANAL DEPTHS AND THE USE OF SEPTIC TANKS

A. CANAL DEPTHS

What is an optimum canal depth? As shallow as possible, yet deep enough to meet navigation requirements. In the context of finger-fill canals, navigational needs are those of small pleasure craft. The State of Florida reports 297,894 boats registered as of June 10, 1974. Of the total, 94 percent of the vessels measured 26 feet or less in length. Similarly, North Carolina reports 112,530 vessels registered as of January 1, 1975, of which 98.3 percent measure less than 28 feet in length. Obviously, shallow-draft boats are to be the principal vessels of consideration in establishing navigational depths. The majority of boats are amenable to navigational depths of four to six feet.

Based on the above consideration and the results of these environmental studies, it is recommended that canal depths not exceed four to six feet at mean low tide. The environmental considerations leading to this recommendation are presented in the following discussion.

Flushing or residence time(s) is a relative measure of the ability of a system to purge itself of a given constituent. The coupling of dispersive and advective forces establishes the flushing characteristics of a waterway. In the cases of the Florida and North Carolina canals, elapsed times ranging from 70 to 250 hours were required to effect a 90-percent removal of a dye tracer. Considering the water quality constituent five-day biochemical oxygen demand (BOD_5), approximately 70 to 80 percent of the total BOD is exerted in 120 hours. Thus, increasing residence time requires the canal to assimilate an increasingly greater share of the oxygen-demanding matter. Furthermore, the restricted circulation of the canal systems limits their reaeration capability.

Flushing dynamics result from a complex set of physical conditions. Many of these factors are not presently understood, others can not be controlled, and some are effected for conveniences. The dimensions of a canal system are a matter of economic convenience. Flushing times under variations in canal depth and length were simulated. Flushing times are maximized with increases in depth. For example, Canal V at Big Pine Key, a doubling of depth increased flushing time from 230 to 660 hours. A doubling of length effected an increase to 400 hours, while a halving of the depth decreased the flushing time to 90 hours. Consequently, if flushing times and assimilative capacities are to be optimized, then canal depths and lengths (to a lesser extent) must be minimized.

If the "coast line" is identified as the most seaward point of aboveground vegetation, a point 1/4 of a mile inland to a point 1/4 mile seaward from this coastline is generally the extremes of the mixing zone for inland drainage and saline waters. Ground surface/bay bottoms elevation tapers from approximately +2 to -4 feet mean sea level. Yearly tidal ranges are on the order of -1 to +2 feet mean sea level with a mean elevation of 1.0 foot. This tidal prism (tide range) then constitutes 70-100 percent of the total water column, thus optimizing mixing and flushing. If depths of -20 feet mean sea level are introduced, only 14 percent (3/22) of the water column is moved in the tidal excursion. In addition, the shallow estuaries are mixed by wind-induced circulation; whereas, canals (deep and narrow) have little potential for appreciable mixing by wind.

The canal systems surveyed varied in depth from eight to twenty-five feet at mean stage. Obviously, the design depth was predicated upon fill requiremanets and not optimization of tidal flushing. The consequences of poor flushing were readily demonstrated by the results section of this report.

Salinity stratification in the canals at Punta Gorda, Florida had a paramount affect on water quality. An example of severe stratification is given in Figure 1. The data accompanying the figure show the water quality consequences--i.e., anoxic conditions and nutrient enrichment of the entrapped and dense saline stratum. In addition, bottom life was eliminated. Nutrients (nitrogen and phosphorus) diffusing to the upper layer were exported from the canal via tidal exchange at a loading rate equivalent to that produced from a 25,000 to 30,000 gallon per day activated sludge treatment plant.

Violations of state dissolved oxygen standards were common occurrences in all canals surveyed in August - September 1974. In Figures two to three, a summation of dissolved oxygen (DO) observations with respect to depth is presented for the canal studies involving interior canal stations--background stations were excluded from figures. In both states, water quality standards were violated in the canal systems at depths usually exceeding four to five feet. Datum is mean stage--approximately one foot above mean low water.

Aside from the developmental loads to the canals (septic tank leachate and runoff), poor flushing characteristics can be identified as the principal factors affecting the dissolved oxygen budget of the canal systems. In turn, flushing is functionally related to depth of the canal. Thus, needed is a determination of an optimum depth that will maximize canal flushing and meet navigational needs and minimize the potential for violations of state DO standards. It is recommended that depths be no more than four to six feet at mean low water.

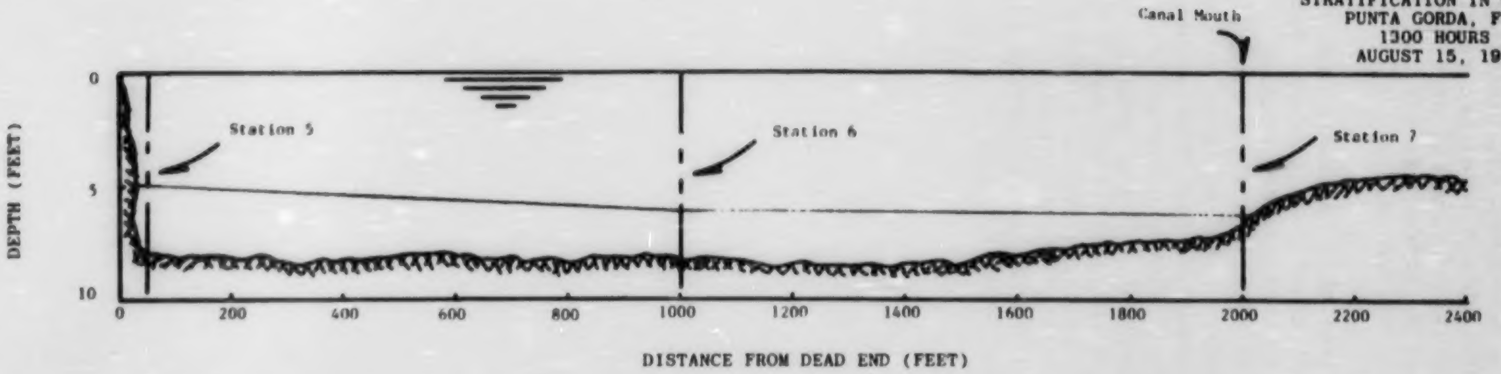
B. SEPTIC TANKS

The Environmental Protection Agency is endeavoring to enforce "best practical treatment" in the 1970's with efforts to obtain "best available treatment" in the early 1980's. Septic tank/sorption fields may be viewed as acceptable treatment in the context of rural development where the purity of the ground and surface waters can be protected. This protection is safeguarded by adequate sorption field design, long distances to surface water bodies and relatively low housing unit densities. In contrast, coastal canal developments maximize housing unit density, and proximity to surface water bodies and thus eliminates the safeguards inherent in the rural environments.

A simple mass balance reveals that constituents (chemical, bacterial and viral) introduced into the sorption field are subject to either retainment in the field, die off (in the case of bacteria and viruses) or transmitted to ground and surface waters. The prime concern is the quality of the leachates entering the ground and surface waters.

Results of these studies show in several cases that leachates are transmitted rapidly to the canal waters. Time of travel measured was four to sixty hours. The effects of these rapid transmissions were evident in: (1) high nutrient levels in ground and canal waters, and (2) violations of bacteriological standards in canal waters. Based on literature review these relatively short travel times indicate that both viable bacteria and viruses can enter the canal waters and create a potential public health problem. Our studies show the potential to be a reality in many cases, i.e., 2,400,000 fecal colonies per 100 milliliter were recorded in canal waters near septic tank leach fields during July 1975 at Surf City, NC. Also, the transmission of nutrients to the canals via contaminated groundwaters must be viewed as being at least partially responsible for observed ecological imbalances in canal systems.

FIGURE 1
STRATIFICATION IN CANAL II
PUNTA GORDA, FLORIDA
1300 HOURS
AUGUST 15, 1974



Station 5

Depth	Temp.	Sal.	D.O.	TKN	NH_3	NO_2-NO_3	P
1	32.6	2.3	4.4				
2	30.9	2.3	4.2				
3	30.9	2.4	3.6				
4	30.1	2.4	1.8	0.62	0.15	0.07	0.18
5	30.6	4.1	0.9				
6	30.6	20.0	0				
7	29.4	29.9	0	8.80	8.25	0.01	2.16
8	28.9	29.4	-				

Station 6

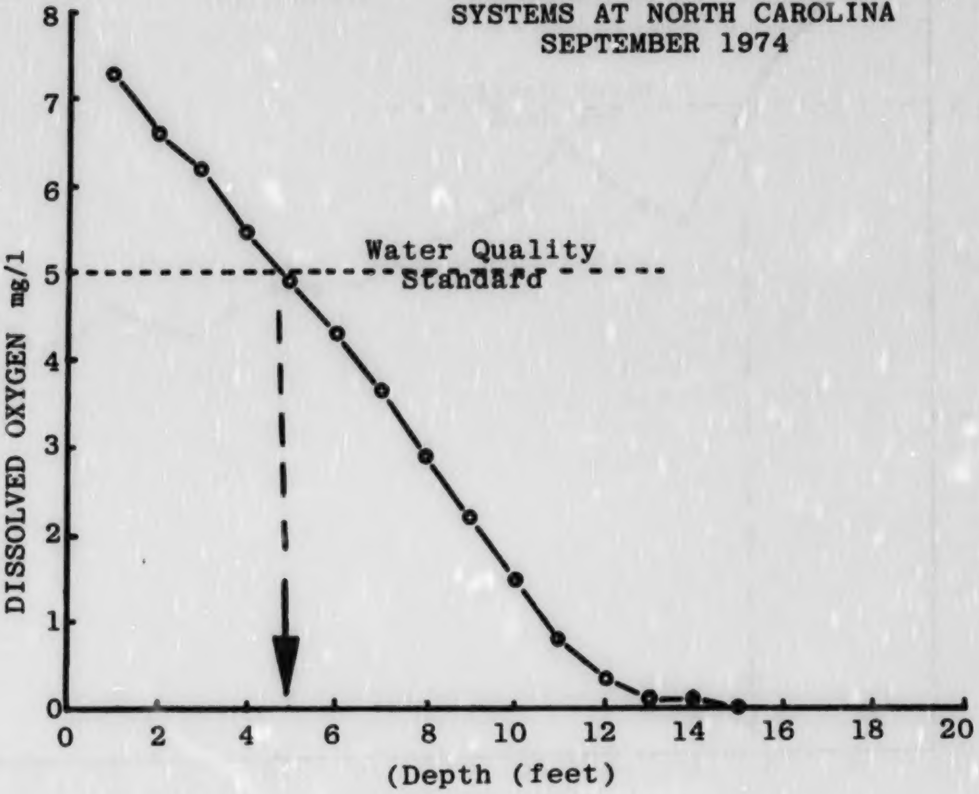
Depth	Temp.	Sal.	D.O.	TKN	NH_3	NO_2-NO_3	P
1	31.1	2.5	3.8				
2	30.8	2.5	3.2				
3	30.5	3.0	2.8				
4	30.6	4.1	2.7	0.65	0.15	0.05	0.22
5	30.7	5.2	2.6				
6	30.7	5.8	0.2				
7	30.0	29.4	0	9.5	8.85	0.01	2.64
8	29.4	29.4	-				

Station 7

Depth	Temp.	Sal.	D.O.	TKN	NH_3	NO_2-NO_3	P
1	31.9	5.2	3.4				
2	30.4	7.0	3.0				
3	30.9	8.4	3.0				
4	30.8	9.7	2.8	0.76	0.10	0.04	0.22
5	30.8	9.8	3.0				
6	30.9	10.3	3.2				
7	30.7	10.3	-				

NOTE: Temp. in °C, Sal in PPT, D.O. & nutrients in mg/l.

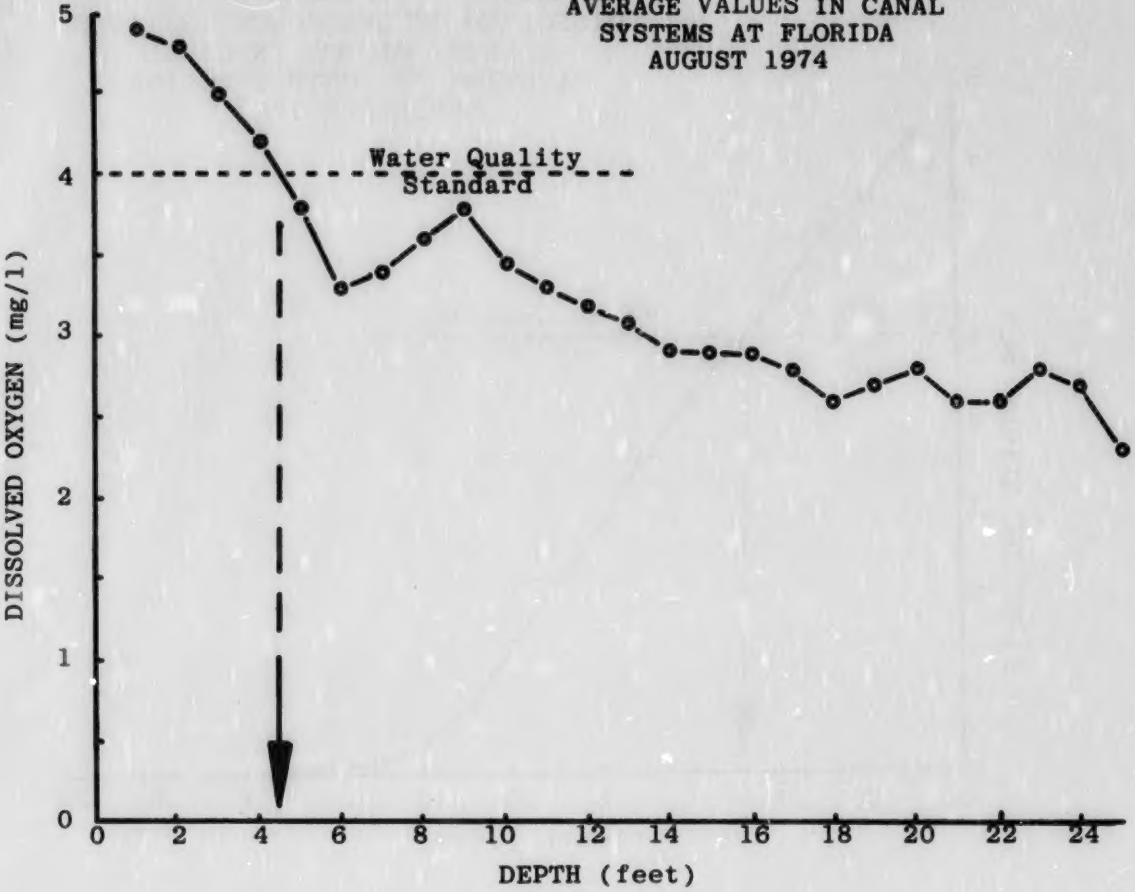
FIGURE 2
DISSOLVED OXYGEN CONCENTRATIONS
AVERAGE VALUES IN CANAL
SYSTEMS AT NORTH CAROLINA
SEPTEMBER 1974



DISSOLVED OXYGEN STATISTICS
AVERAGE VALUES IN CANAL
SYSTEMS AT NORTH CAROLINA
SEPTEMBER 1974

No. of Observations	Avg DO	RANGE	% ≥ 5.0	% ≤ 4.9	95% Confidence Interval		Std Deviation
45	7.3	11.7-4.7	91	9	3.9	10.7	1.7
45	6.6	9.6-4.1	87	13	3.7	9.5	1.5
45	6.2	9.0-4.0	80	20	3.5	8.9	1.3
45	5.4	7.2-3.8	71	29	3.5	7.3	1.0
45	4.9	6.8-3.3	60	40	3.3	6.5	0.8
45	4.3	6.3-2.3	29	71	2.2	6.4	1.0
42	3.6	5.4-1.0	17	83	1.2	6.0	1.2
37	2.9	5.1-0.1	5	95	0.3	5.5	1.3
33	2.2	4.6-0.6	0	100	0	4.7	1.2
30	1.5	3.9-0	0	100	0	3.8	1.1
21	0.8	1.9-0	0	100	0	2.2	0.7
10	0.4	1.6-0	0	100	0	1.5	0.5
7	0.1	0.4-0	0	100	0	0.5	0.1
2	0.1	0.2-0	0	100	0	-	-
1	0	0	0	100	0	-	-

FIGURE 3
DISSOLVED OXYGEN CONCENTRATIONS
AVERAGE VALUES IN CANAL
SYSTEMS AT FLORIDA
AUGUST 1974



DISSOLVE OXYGEN STATISTICS
CANAL SYSTEMS AT FLORIDA
AUGUST 1974

Depth	No. of Observations	Avg DO	Range	% > 4.0	% ≤ 3.9	95% Confidence	Interval	Std Deviation
1	134	4.9	8.7-1.4	84	16	2.7	7.1	1.1
2	134	4.8	7.6-1.5	80	20	2.6	7.0	1.1
3	134	4.5	6.9-1.4	71	29	2.2	6.8	1.1
4	134	4.2	6.9-0.8	64	36	1.6	6.8	1.3
5	134	3.8	6.9- 0	55	45	0.3	7.3	1.8
6	134	3.3	7.0- 0	47	53	0	7.4	2.1
7	125	3.4	7.0- 0	46	54	0	7.5	2.1
8	99	3.6	7.2- 0	44	56	0	7.5	2.0
9	67	3.8	8.0- 0	46	54	0	7.4	1.9
10	40	3.4	7.1- 0	40	60	0.4	6.4	1.5
11	33	3.3	5.2-1.0	33	67	1.1	5.5	1.0
12	30	3.2	5.1-1.0	23	77	1.1	5.3	1.0
13	28	3.1	5.0-1.1	14	86	1.1	5.1	1.0
14	24	2.9	4.3-1.1	8	92	0.9	4.9	1.0
15	24	2.9	4.2-1.1	8	92	1.0	4.8	0.9
16	22	2.9	4.2-0.8	9	91	0.9	4.9	1.0
17	17	2.8	4.0-0.7	6	94	0.7	4.9	1.0
18	15	2.6	4.0-0.7	7	93	0.5	4.7	1.0
19	14	2.7	3.6-1.2	0	100	1.0	4.4	0.8
20	11	2.8	3.6-0.9	0	100	1.2	4.4	0.7
21	9	2.6	3.6-0.6	0	100	0.6	4.6	0.9
22	8	2.6	3.6-1.3	0	100	0.9	4.3	0.9
23	6	2.8	3.4-2.3	0	100	1.8	3.8	0.4
24	2	2.7	2.9-2.4	0	100	-	-	-
25	1	2.3	2.3	0	100	-	-	-

V. BACKGROUND

The coastal region of the Southeastern United States features a near continuous belt of wetlands marking the transition zone between the uplands and estuaries. The wetlands are unified with the open coast and estuary by tidal waters, thus creating an open ecosystem in terms of the flow of energy and matter. Only artificial boundaries exist between ecosystem compartments. By definition, an ecosystem features a fully integrated, self-maintaining unit, the compartments of which contribute, in total, to the survival of the system. Each compartment is characterized by a set of physical, chemical, and biological constraints, thus making the system unique and limited in area.

Wetlands are a vital component in the maintenance of ecosystems, and their importance cannot be overemphasized. Numerous authors (1), (2), (3), (4), (5), (6) clearly identify the essential role wetlands play in the maintenance of commercial and sports fisheries in the estuaries and oceans, as well as their contribution to water quality.

Freshwater is introduced into this mixing zone by overland flow which originates from inland urban and rural runoff and subsurface flow which stems from aquifer drainage. These flows vary throughout the hydroperiod and meet near the coastal fringe to make up the freshwater input to the estuarine system. Numerous shallow tidal creeks passing through the coastline provide a broadfront for this combined freshwater input to the estuary and also provide a nutrient input to the coastal vegetation. The vegetation in turn takes up nutrients and releases detrital material and in essence regulates the food chain in the ecosystem. During periods of either extreme tides (low or high), the very presence of vegetation and shallow flats of the system buffer the effects to the upland system.

A current environmental issue concerns the development of ecologically valuable wetlands for the purpose of creating artificial, waterfront real estate by the excavation of canals. Two methods of canal development are prevalent throughout coastal, riverine, and lake ecosystems of the Southeastern U. S. One method, utilized extensively in the Carolinas and the northern Gulf coastal area, is the excavation of an access channel through wetlands either by widening existing tidal creeks or the creation of a totally new water course. Branching from such channels may be a "perimeter" canal along the marsh upland ecotone or a series of extensive canals through the uplands. This method of development often results in adverse ecological consequences affecting both wetlands and water quality. The second method of development, employed extensively in the Florida peninsula and Keys, is the excavation of canals within wetlands. The spoil is used to cover adjoining wetland and raise elevation for the purpose of residential development. Environmental alteration and destruction resulting from this type of development are absolute and represent a two-fold threat to the survival of existing coastal ecosystems. Not only are the multifarious contributions of the wetland permanently eliminated, they are replaced by a system that, in most cases, contributes negatively toward maintaining a quality ecosystem.

Canal systems excavated in lowlands satisfy a purpose incongruent with the function of the natural system. The purpose is to excavate channels to accelerate dewatering of wetlands, providing fill and waterfront property for residential development. The depth of the channels is primarily governed by fill requirements and not navigational needs. In light of the natural conditions, the function of the canal systems is not analagous to tidal creeks, rivers, and marshes. ·For instance, the deep canals accelerate runoff, lower freshwater aquifers, disrupt nutrient inputs to the vegetative food chain, deny the hydraulic buffering effect of the shallow flats and probably provide sinks for nutrients and dense saline waters.

The increased demand for waterfront property coupled with a dwindling availability of naturally occurring water frontage has provided the impetus for a proliferation of canal development within the past decade. A number of factors -- such as emphasis on capital gain for waterfront property plus complete disregard and limited understanding of the value and total contributions of wetlands -- has allowed wetland development to proceed largely unrestricted. As the ecological value and the rate at which wetlands were diminishing became more apparent to both the public and private sectors, regulatory agencies were forced to rely on ecological rationales as a basis for judging environmental risks and liabilities associated with development in areas rich in aquatic resources.

Prior to October, 1972, federal jurisdiction over wetlands was provided only by the requirements under Section 10 of the River and Harbor Act of 1899 which covered only permits authorizing works in navigable waters. Under this Act, protection of wetlands was limited only to areas below the mean high water line as interpreted by the U. S. Army Corps of Engineers, the permitting agency. Coastal ecosystems are with valuable biological resources occurring both above and below mean high water (MHW). The artificial boundary (MHW) left hundreds of thousands of acres open to development without, or with limited, regard for ecological ramifications.

Recognition of the value of wetlands by government officials and concerned citizens prompted legislation directed specifically at the regulation of development in wetland areas. In some instances, legislation approached wetland protection in an ecological sense by using plant association, sometimes with accompanying tidal datum to define jurisdictional limits. This approach naturally extended government jurisdiction to wetlands above mean high tide in some states.

Passage of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) provided the greatest step toward protection of all wetland areas against indiscriminate destruction by spoil disposal and other filling activities. Section 301 (a) of this law provided the requirement of federal permits for discharge of any pollutants into waters of the United States. In this context dredged spoil and fill material are considered pollutants. Section 404 of the law provided a permit system and guidelines to govern the disposal of such material in navigable waters. Primary attention is directed toward preventing adverse ecological effects on shellfish, fish, and wildlife habitat and recreational areas.

The rationale supporting extension of federal jurisdiction to all wetlands by Section 404 of the law is clear and simple. First, "navigable waters" are defined by law as "waters of the United States." Secondly, all coastal, estuarine, riverine, and lacustrine wetlands inundated by waters of the U. S. on a normally predictable basis are, therefore, themselves an extension and integral component of U. S. waters. Thirdly, and most decisively, the value of wetlands as spawning and nursery areas for fish and aquatic life, and as wildlife and recreational areas, as well as in the maintenance of water quality, is undisputable.

This section of the law is unique in that it requires an assessment of anticipated ecological consequences paramount to economics and navigation before final approval or disapproval of a dredge-and-fill project permit. This rationale represents a reversal of previous procedure. If ecological quality of aquatic ecosystems is to be maintained, wetland resources must be preserved. No longer can an economic yardstick be the ultimate and decisive judgment factor.

Although the U. S. Army Corps of Engineers has the responsibility for administering the Section 404 program, the Environmental Protection Agency (EPA) was delegated ultimate authority to deny or restrict permitted actions destructive to wetlands under Section 404(c). The Agency's decision toward the preservation of such areas was adopted soon after delegation of this authority and is set forth in the Administrator's Decision Statement Number 4, "EPA Policy to Protect the Nation's Wetlands", dated February 21, 1973. In this statement, the importance of all wetlands, fresh and saltwater alike, is recognized, along with their irreplaceability and man's dependence upon them. This belief is reinforced by the statement of policy to protect all wetlands from abuse and destruction. Prior to this policy, EPA involvement in canal development projects was limited primarily to an assessment of expected water quality repercussion. Now, with the support of congressional authority and in compliance with overall Agency policy, Region IV of EPA is committed to an aggressive program of both wetland and water quality protection.

VI. STUDY AREAS

Five distinctly different geographic areas were investigated during this study including Punta Gorda, Big Pine Key, Panama City and Marathon, Florida and Atlantic Beach, North Carolina.

A. PUNTA GORDA, FLORIDA

The first of these areas was near Punta Gorda, Florida located in the coastal reaches of Charlotte County in West Central Florida. Charlotte County is the southernmost county in the Southwest Florida Water Management District. The streams and drainage canals in Charlotte County drain into five basins, four of which empty into Charlotte Harbor. The western portion of the county, in which Punta Gorda is located, has ground elevations generally less than 10 feet above sea level. Delineation of land surfaces becomes most difficult in the coastal fringes. Mud flats and mangrove swamps blend the coastal plains into the shallow Gulf bottoms.

Numerous canal developments have been constructed along the tidal creeks and low lying salt marsh lands bordering Charlotte Harbor. This investigation concentrated on one such small canal development along one of the major tidal creeks, Alligator Creek. This creek drains primarily low lying lands consisting of salt marsh and mangrove estuarine zones. Alligator Creek is classified as Florida class III waters, i.e., waters for recreation, propagation and management of fish and wildlife. Charlotte Harbor, into which Alligator Creek drains, is classified as class II waters, i.e., suitable for shellfish harvesting. Appendix A-1 contains these classifications along with the associated water quality criteria.

Two canals located on Alligator Creek were selected for study (Figure 4). Both canals (designated Canals I and II) were constructed in about 1956 and are approximately 2,000 feet long and 7 feet deep. Canal II has been developed residentially with sparse development along its shores (12 house with septic tanks). This canal paired with the totally undeveloped canal (I) provides a comparison of natural aging to aging influenced by man's intervention.

B. BIG PINE KEY, FLORIDA

The second area investigated was on Big Pine Key, Florida which is located in the lower keys of Monroe County. Big Pine Key is bordered by the Straights of Florida on the south and east and by Florida Bay and the Gulf of Mexico on the north and west. Ground surfaces generally are less than 5 feet above sea level and composed primarily of marine deposits of very permeable limestone known as Miami Oolite. As in the Punta Gorda area, delineation of land surfaces is most difficult along the coastal fringes. Limerock surfaces blend into sparse mangrove stands and, subsequently, into shallow oceanic bottoms. Waters in the Big Pine Key area are class III waters, i.e., waters for recreation, propagation and management of fish and wildlife.

Freshwater aquifers are nearly non-existent in the Florida Keys. Big Pine Key homeowners generally receive their freshwater supply from the Florida Aqueduct Authority via pipage which lies above the rocky surface.

At several locations on Big Pine Key, waterfront homesites have been provided by finger-fill canal developments. The typical construction method employed has been to excavate the Oolitic limestone and to utilize the spoil to elevate homesites along the canal banks. This investigation concentrated on one such development, Doctors Point subdivision, located on the eastern side of Big Pine Key (Figure 5). In this area, 8 houses with septic tanks are located along one canal system (Canal IV, Figure 6). Nearby is a recently constructed, undeveloped system (Canal III, Figure 6). Comparisons were made between these two systems both of which were approximately 10 feet deep and less than a quarter of a mile in length.

C. MARATHON, FLORIDA

The third site investigated was the Sea Air Estates subdivision at Marathon, Florida, located on Vaca Key (Figure 7). General topography and soil types are similar to those at Big Pine Key. Canals at this location are of typical box-cut construction with depths of approximately 16-25 feet mean low water. Lateral or finger canals are approximately 1,500 feet long and open into a large basin which has an irregular bottom with depths approaching 25 feet. The basin originated as a borrow pit. Very little home building has taken place at this location.

D. ATLANTIC BEACH, NORTH CAROLINA

The fourth area, Atlantic Beach, is located in Carteret County and separated from the mainland by Bogue Sound (Figure 8). The surface of the sandy loam soils of the study area is generally 0 - 10 feet above mean sea level.

Much of the area has been developed into high density mobile home subdivisions. Waterfront access has been provided by dredging and filling *Spartina* and *Juncus* marshlands.

One such development was investigated at Atlantic Beach (Figure 9). This development was predominately mobile homes with a few houses and motel units which use septic tanks/drainfields to treat wastewaters. Canal depths were approximately 6 - 20 feet and lengths were 1,200 to 3,000 feet. Waters in and around the development carry the highest North Carolina classification, SA (Shellfish Harvesting - Appendix A-2).

Three additional sites were investigated in this North Carolina area (Figures 8 and 9). The first was a condominium community located approximately one mile northeast of the previously discussed Atlantic Beach site.

This is served by a wastewater treatment system and has canal depths and lengths of 8 and 2,000 feet respectively. The second was located on the mainland side of Bogue Sound at Spooners Creek. Septic tanks/drainfields provide treatment of sanitary wastes at the Spooners Creek area. The third site is near Emerald Isle. Only limited sampling was carried out at this site. Waters at all of these sites are classified SA; however, the Spooners Creek area is closed to shellfish harvesting due to elevated coliform bacteria counts.

E. PANAMA CITY, FLORIDA

The fifth and final study area was at Panama City in the Florida panhandle. Two canal developments surveyed at this area were the Woodlawn and Hentz canals (depths of 10 feet or less) located on the west side of St. Andrews Bay and on the east side of St. Andrews Bay in Pretty Bayou, respectively. The Woodlawn Canal is approximately 20 years old with all of its adjacent lots (45) developed. Sewage treatment is afforded by a central sewerage system which discharges into St. Andrews Bay at a point just north of the Woodlawn canal mouth. The canal systems are shown in Figure 10.

The Hentz Canal is approximately 10 years old. There are 33 houses adjacent to the canals. Approximately 5% of the lots adjacent to the Hentz Canal are undeveloped. Septic tanks and sorption fields are the mode of wastewater disposal in this area.

FIGURE 4
STUDY AREA
PUNTA GORDA, FLORIDA
NOV 73 & AUG 74

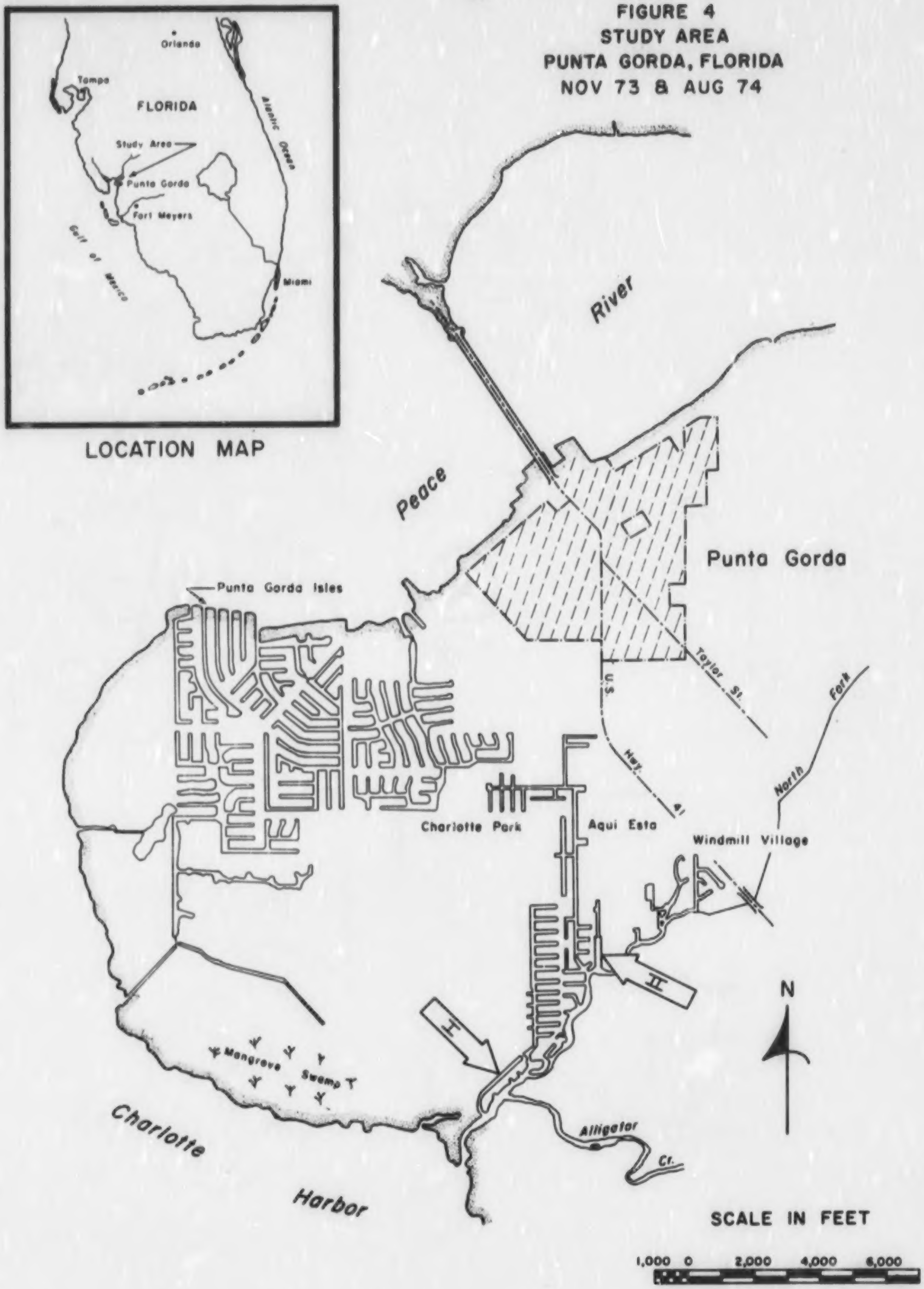

Orlando
Tampa
FLORIDA
Study Area
Punta Gorda
Fort Meyers
Atlantic Ocean
Gulf of Mexico
Miami
LOCATION MAP
Peace River
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy. 41
North Fork
Charlotte Park
Aqui Esta
Windmill Village
II
I
N
Mangrove Swamp
Charlotte Harbor
Alligator Cr.
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 5
STUDY AREA
BIG PINE KEY
NOV 73 & AUG 74

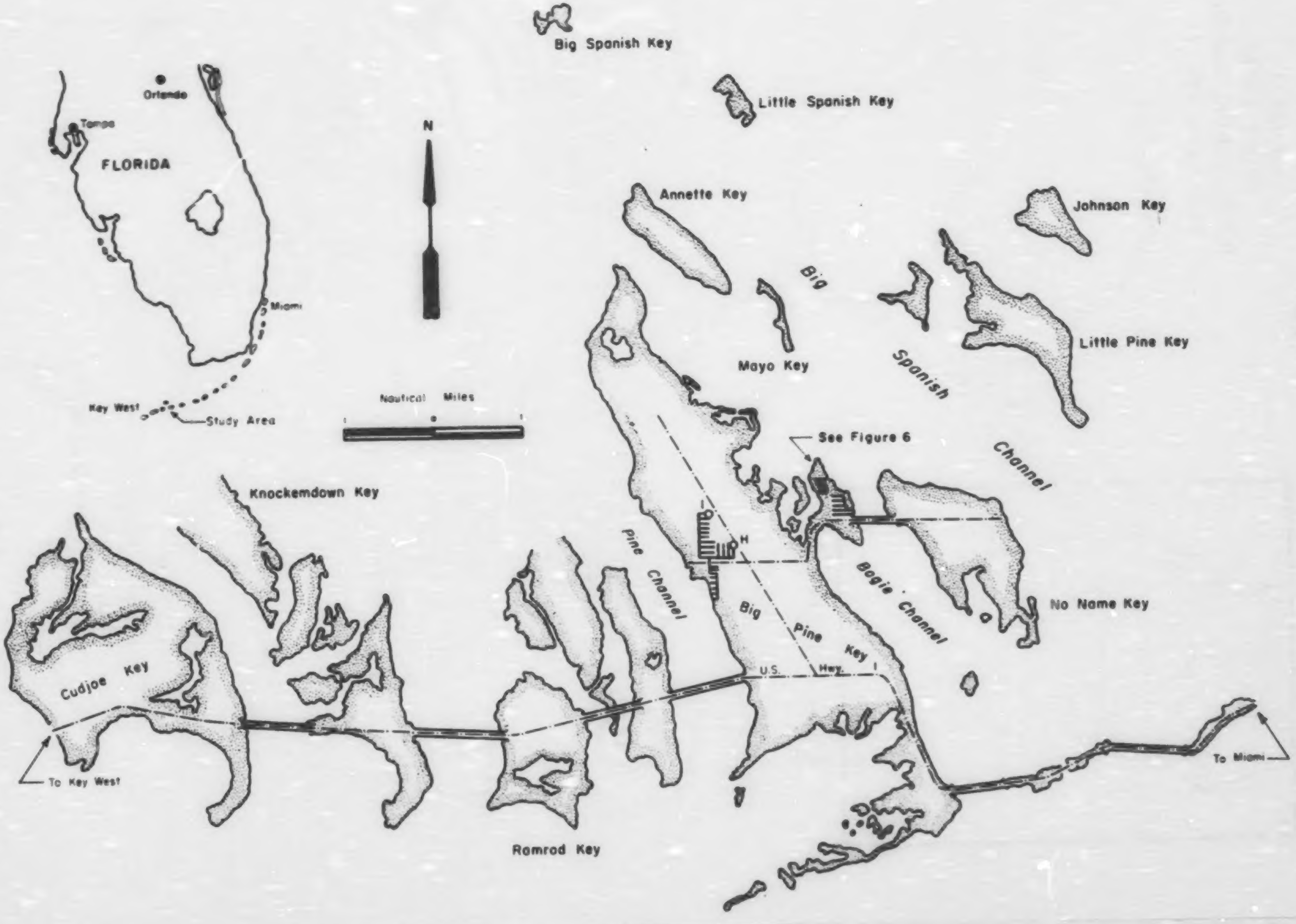
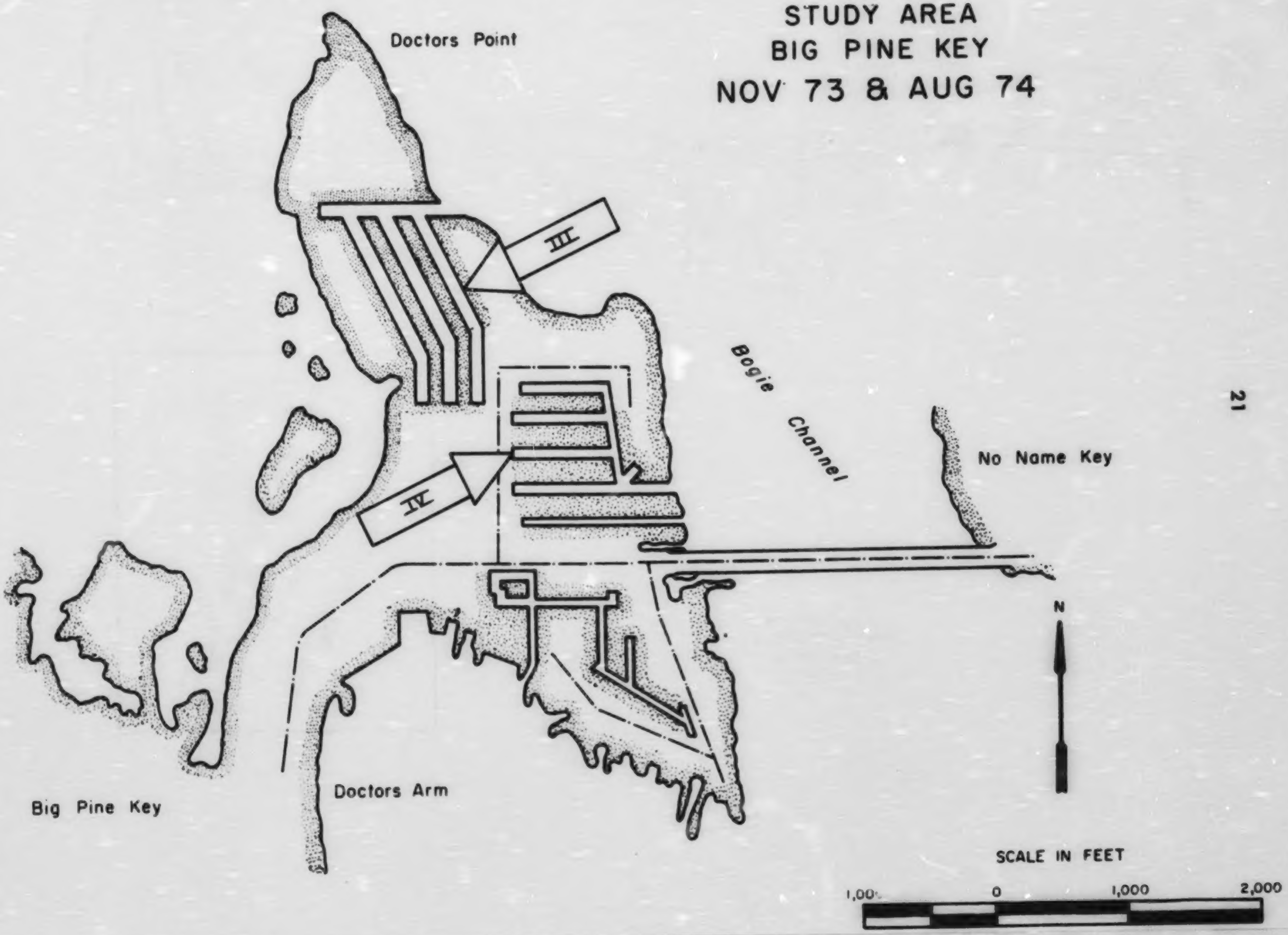

Big Spanish Key
Little Spanish Key
FLORIDA
Orlando
Tampa
Miami
Key West
Study Area
N
Nautical Miles
1
0
1
Annette Key
Johnson Key
Big
Spanish
Channel
Mayo Key
Little Pine Key
See Figure 6
Knockemdown Key
Pine Channel
H
I
Bogie Channel
Big Pine Key
U.S. Hwy. 1
No Name Key
Cudjoe Key
To Key West
To Miami
Ramrod Key

FIGURE 6
STUDY AREA
BIG PINE KEY
NOV 73 & AUG 74


Doctors Point
III
Bogie Channel
No Name Key
IV
N
Big Pine Key
Doctors Arm
SCALE IN FEET
1,000
0
1,000
2,000

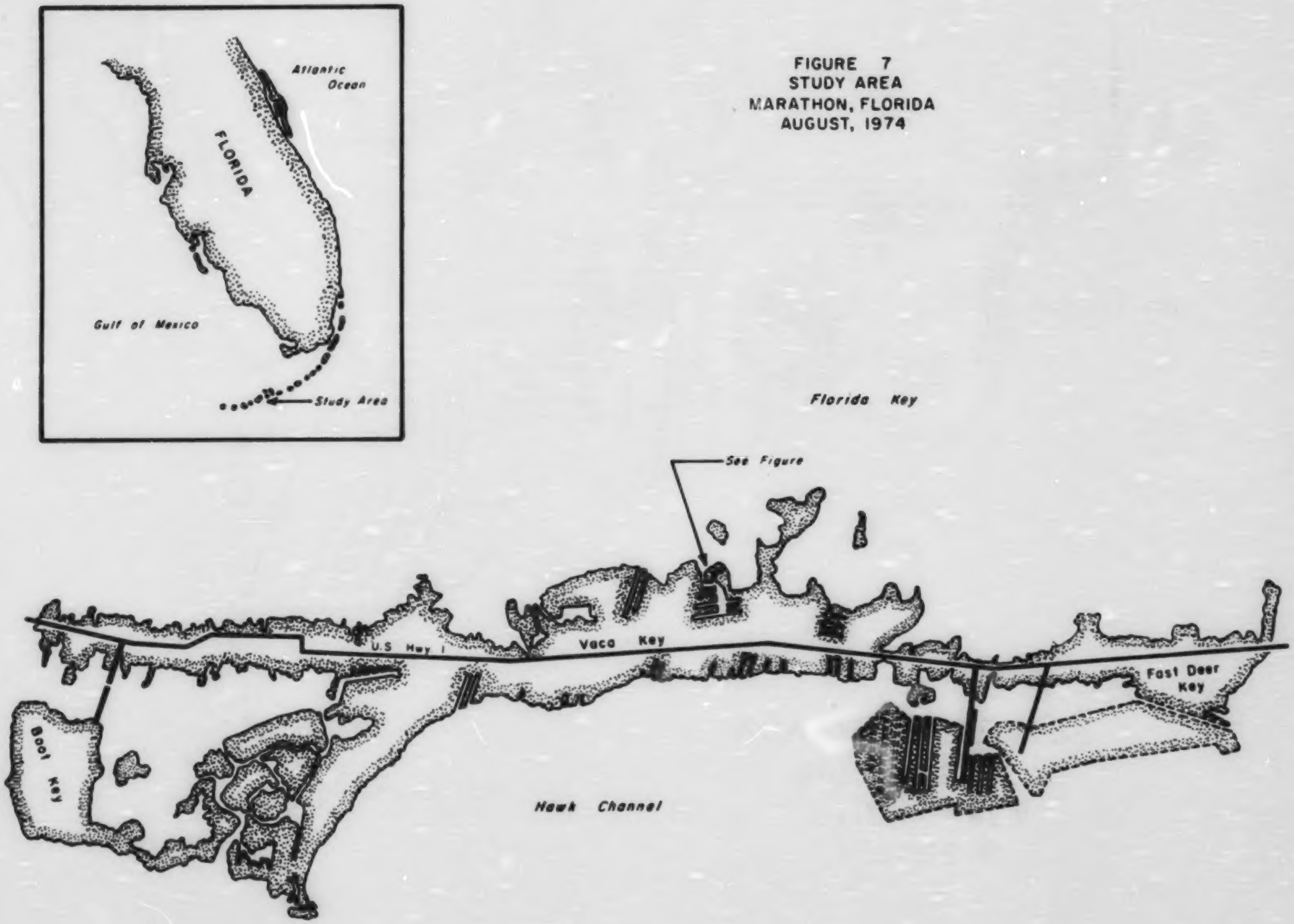

Atlantic Ocean
FLORIDA
Gulf of Mexico
Study Area
Florida Key
See Figure
U.S. Hwy 1
Vaca Key
Fast Deer Key
Boot Key
Hawk Channel

FIGURE 7
STUDY AREA
MARATHON, FLORIDA
AUGUST, 1974

FIGURE 8
STUDY SITES
NORTH CAROLINA
SEPTEMBER, 1974

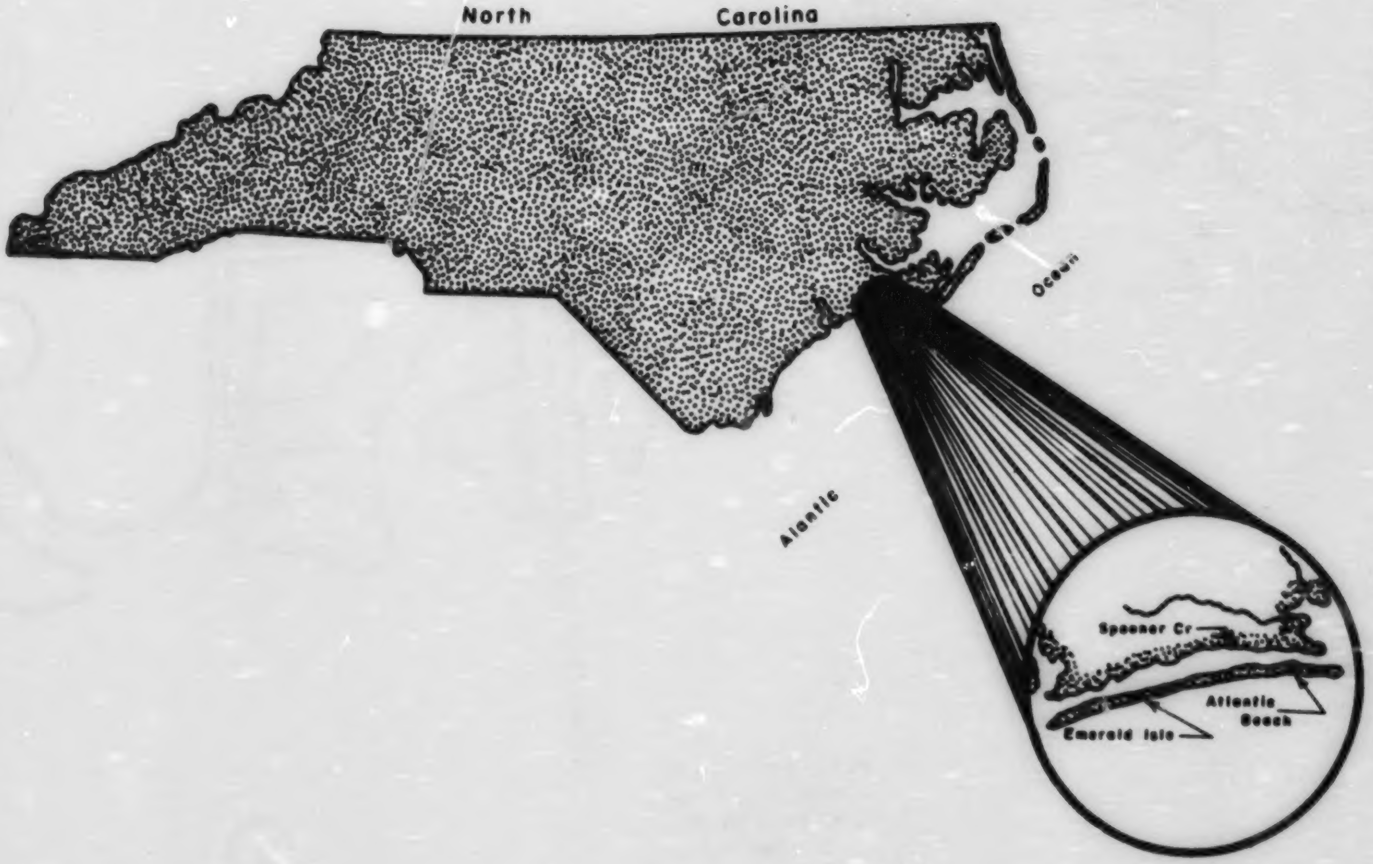

North
Carolina
Ocean
Atlantic
Spooner Cr
Atlantic Beach
Emerald Isle

FIGURE 9
STUDY AREA
ATLANTIC BEACH
SEPTEMBER, 1974

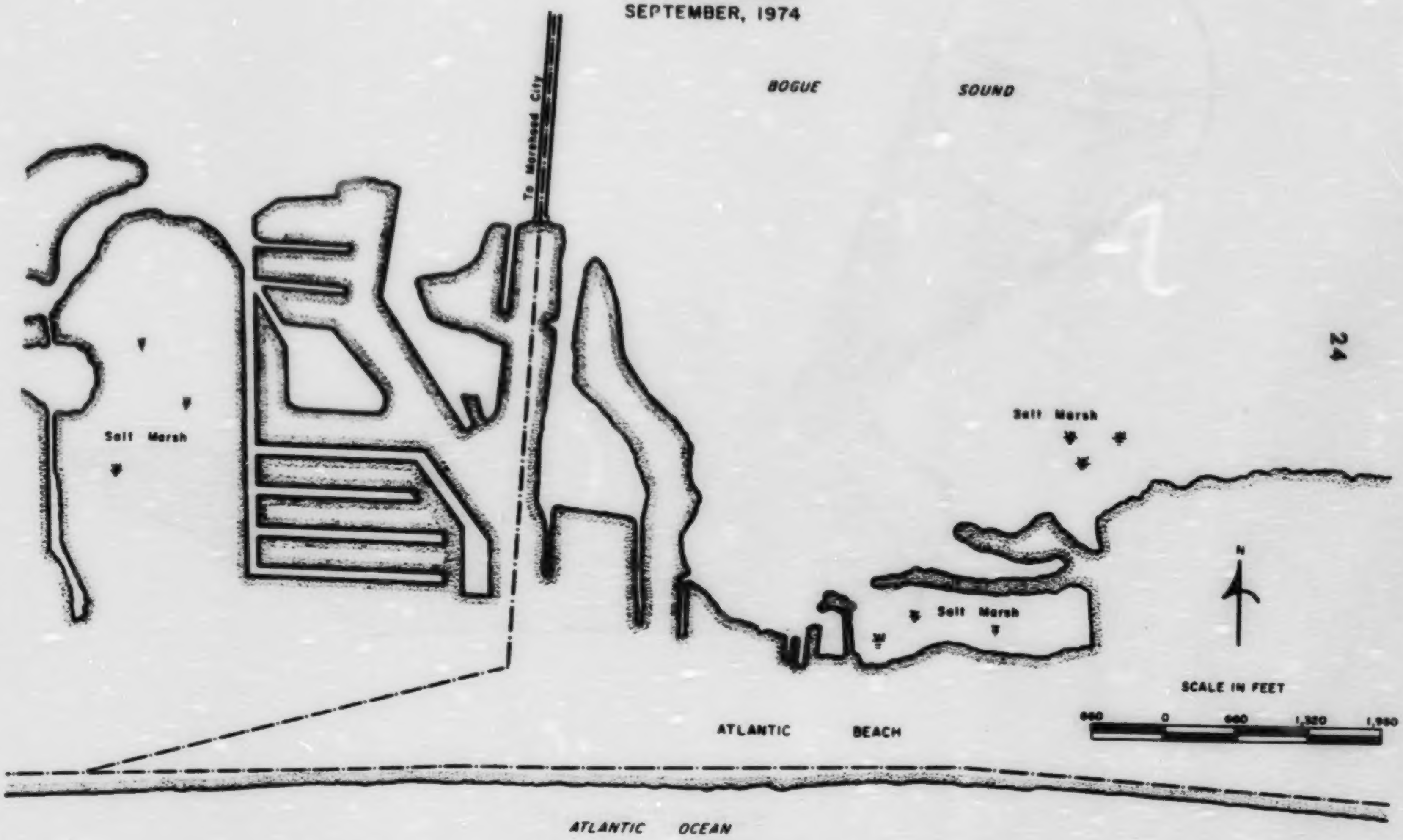
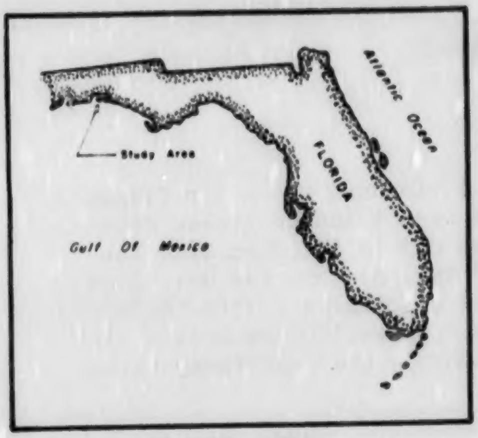
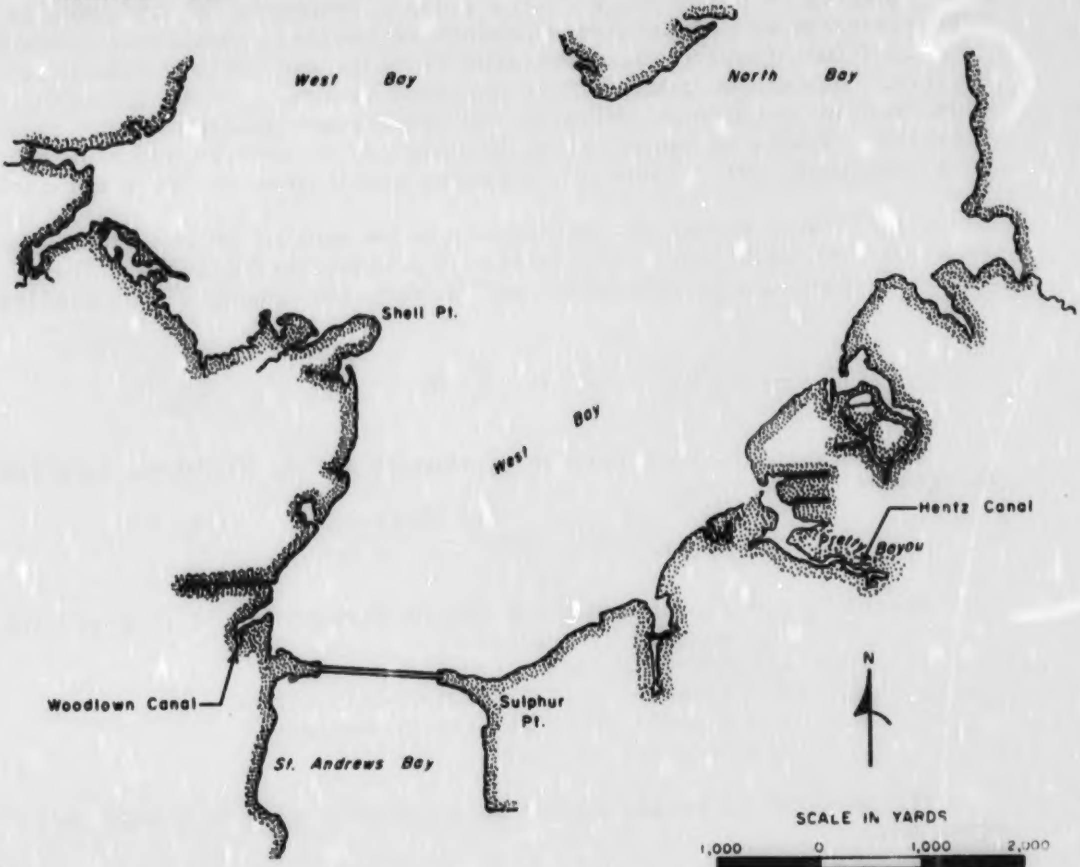

BOGUE
SOUND
To Morehead City
Salt Marsh
Salt Marsh
Salt Marsh
N
SCALE IN FEET
660
0
660
1,320
1,980
ATLANTIC
BEACH
ATLANTIC
OCEAN

FIGURE 10
STUDY AREA
PANAMA CITY, FLORIDA
SEPTEMBER, 1974


Atlantic Ocean
FLORIDA
Study Area
Gulf Of Mexico

LOCATION MAP


West Bay
North Bay
Shell Pt.
West Bay
Hentz Canal
Pretty Bayou
Woodlawn Canal
Sulphur Pt.
St. Andrews Bay
N
SCALE IN YARDS
1,000
0
1,000
2,000

VII. STUDY RESULTS

A. TIDAL EXCHANGE STUDIES

A dye tracer was used to compare tidal flushing rates for finger fill canals of various lengths, depths and widths and to gather data for verification of predictive mathematical models (Section H). The basic procedure was to inject Rhodamine WT dye, measure the dye cloud configuration with respect to time, compute dispersion coefficients for input into the mathematical models and then verify the models with field measured time-history concentration curves and mass decay rates.

1. Dispersion

Flushing of a contaminant from a canal system is accomplished by both advective and dispersive transport mechanisms. Advective transport is controlled by velocities generated by tides and inflows from external sources. Dispersive transport is governed by many factors including wind induced turbulence, salinity and temperature gradients, and tidal velocity. Simple mathematical techniques can be used to describe advective transport, but dispersive transport predictions are more difficult.

Field measurements of dye clouds can be applied to one dimensional mass transfer equations to calculate dispersion coefficients. The following equation is generally used to describe concentration gradients (7).

$$\frac{\partial c}{\partial t} = \frac{D_L}{A} \frac{\partial}{\partial x} \frac{(A \partial c)}{x} - U \frac{\partial c}{\partial x} \pm S \qquad \text{(Eq- 1)}$$

For an instantaneous release of mass at x = 0, the above equation integrates to the form:

$$C_{x,t} = \frac{M}{2A\sqrt{\pi D_L t}} \exp - \frac{(x-ut)^2}{4 D_L t} \qquad \text{(Eq- 2)}$$

where; $C_{x,t}$ = tracer concentration at distance x and elapsed time t
M = mass of dye released
A = cross sectional area of channel
D_L = longitudinal dispersion coefficient
t = elapsed time from tracer release
u = velocity of flow

The peak concentration occurs at a distance ut with a magnitude equal to:

$$\frac{M}{2A\sqrt{\pi D_L t}} \qquad \text{(Eq- 3)}$$

Concentrations upstream and downstream from the peak decrease with distance by:

$$C_{x,t} = C_p \exp - \frac{(x-ut)^2}{4 D_L t} \quad \text{(Eq- 4)}$$

where C_p = peak concentration.

Ideally in a flowing stream an instantaneous release of tracer would form a cloud (described by equations 1-4) which would have a longitudinal concentration gradient in the form of a bell shaped curve skewed in the downstream direction. The curve would flatten with time as it moves downstream. The "flattening" of the concentration curve is a measure of the dispersion coefficient. In a dead-end canal system with little or no net inflow, the peak concentration is translated downstream only slightly and the bell-shaped concentration curve is not allowed to expand upstream. Instead, the mass of tracer is mixed with and expelled in the tidal prism governed by the oscillating tides. With time, the peak flattens and becomes indistinguishable as the tracer continues to flush from the canal system.

In order to measure longitudinal dispersion coefficient and flushing rates, dye was injected into two canals at Punta Gorda, three canals at Big Pine Key, and two canals at Atlantic Beach. Injections of dye were made at high slack tide as a point source at mid-depth in the canals. The time history of dye concentrations was measured using a boat-mounted flow-through microfluorometer. The fluorometer was calibrated with dye standards in the range of 1 to 500 ppb and adjusted for background fluorescence following each sampling run. Canals I and II (Figure 11), III, IV and V (Figure 12) and VI and VII (Figure 13) were used in the dye studies. The longitudinal points of dye injection were varied in an attempt to ascertain any differences in dispersion in similar canals, particularly in the case of Canals III and V (Table I).

TABLE I
POINTS OF DYE INJECTIONS
PUNTA GORDA AND BIG PINE KEY, FLORIDA
AND ATLANTIC BEACH, NORTH CAROLINA

Canal		Depth	Distance from Dead End	Volume Injected
I	Punta Gorda	MID	100 feet	1500 ml
II	Punta Gorda	MID	650 feet	1500 ml
III	Big Pine Key	MID	50 feet	500 ml
IV	Big Pine Key	MID	50 feet	500 ml
V	Big Pine Key	MID	300 feet	500 ml
VI	Atlantic Beach	MID	200 feet	500 ml
VII	Atlantic Beach	MID	400 feet	500 ml

Prior to the dye injections, stage recorders were installed in the three study areas. Diurnal tides with a range of approximately 2.4 feet were measured at Punta Gorda (Figure 14). At Big Pine Key, semi-diurnal tides with a range of approximately 1 foot were measured (Figure 13), and at Atlantic Beach, semi-diurnal tides with a range of approximately 2.1 feet were measured (Figure 16). A recording fathometer was used to measure the longitudinal and cross sectional configurations of each of the canals (Figures 17, 18 and 19). These sections along with the tidal recordings allowed for volume calculations at any time so that dye concentrations could be related to dye mass.

Figures 20 through 26 describe the time history of the dye concentrations in Canals I, II, III, IV, V, VI and VII respectively. The typical bell shaped curve is seen only in Figure 24 (Canal V) and then only at t - 12 and 15 hours. Figure 27 presents the time history of dye concentrations in Canal I relative to various canal locations. The tracer was found to be well mixed throughout the canal cross sections.

Longitudinal dispersion coefficients calculated from the time-history concentration curves are presented in Table II along with dispersion coefficients derived by an empirical method, described by O'Connor et al., (8), i.e.,

$$D_L = 5.2\ (u\ \max)^{4/3} \qquad \text{4/3 law (Eq - 5)}$$

where

D_L = Dispersion coefficient in sq mile/day.

u max = Maximum tidal velocity at the section in knots.

In Table II, Method A is simply the ratio of the surface area covered by the dye cloud to the elapsed time since the dye injection.

Method B is derived from equation 4. The slope of the line obtained by plotting $\ell n\ C/C_o$ VS $(X-ut)^2$ is given by $\frac{1}{4D_L t}$.

D_L is obtained by measuring the slope and solving; slope = $\frac{1}{4D_L t}$.

The final calculation (method C) is from the solution of the equation for peak concentration (Eq 4).

TABLE II
Longitudinal Dispersion Coefficients (sq mi/day X 10^{-4})
Punta Gorda and Big Pine Key, Florida, November 1973
Atlantic Beach, North Carolina, September 1974

		Method			
Canal	Distance[1]	4/3 law	A	B	C
I	50 feet	-			
I	1200 feet	100	62	35	75
I	2500 feet	1060			
II	50 feet	4			
II	1000 feet	60	--	25	36
II	2000 feet	350			
III	50 feet	1			
III	780 feet	23	15	26	18
III	1560 feet	50			
IV	50 feet	1			
IV	350 feet	10	9	11	3
IV	725 feet	20			
V	50 feet	1			
V	720 feet	20	26	24	26
V	1440 feet	48			
VI	200 feet	7			
VI	800 feet	165	62	50	104
VI	1400 feet	317			
VII	200 feet	6			
VII	1200 feet	611	93	62	186
VII	2600 feet	1730			

[1] distance for which the 4/3 law calculation was made as measured seaward from the dead end. Since the dispersion coefficient is dependent upon velocity, the coefficient becomes larger toward the canal mouths.

Table II shows the empirical method (4/3 law) for calculating longitudinal dispersion coefficients at mid-length locations reasonably approximates the field-measured dispersion coefficients. This similarity was evident at all the canals except Canal VII and, to a lesser extent, Canal VI where field measured coefficients were several times smaller than empirical predictions. Also, when other dispersive driving forces, (i.e., wind, salinity and temperature gradients) are large, the applicability of the empirical value diminishes because it is not considered in the 4/3 law.

Table III provides a comparison of longitudinal dispersion coefficients computed for several well-known estuaries by Thoman et al. (7). Note that the dispersion coefficients decrease as the heads of the estuaries are approached. However, these coefficients are much greater than observed in this study (Table II), thus showing the autocorrelation of diminishing dispersion coefficients with decreasing aerial dimensions of the water body.

TABLE III

LONGITUDINAL DISPERSION COEFFICIENTS
VARIOUS ESTUARIES
(Thoman et al.)

Estuary	Mi^2/day	Tracer	Remarks
Delaware	2-7	Chlorides	Torresdale, PA to Reedy Island, DE
Delaware	7-11	Chlorides	Lower Portion of Estuary to Delaware Bay
Potomac	0.2-0.6	Dye	Upper 25 Mi. Non-Saline Portion
Potomac	0.6-6.0	Chlorides	Middle 25 Mi. Brackish Portion
Potomac	6.0-10.0	Chlorides	Lower 50 Mi. Ch 3,000-10,000 mg/l
Waccasassa (Cedar Key, FL)	2.0-2.7	Chlorides	Small Gulf of Mexico Estuary, Brackish Portion, U_{max} = 0.4 Knots, with Variable Area
Waccasassa (Cedar Key, FL)	0.4-0.8	Dye	Upper Non-Saline Portion
NY Harbor (Including Upper Bay, E. River, N. River, Newark Bay and Kills)	10.0-24.0	Chlorides	Large Saline Harbor, Estuary and Tidal Strait
James	9-11	Sulfates	Non-Saline Portion
Hudson	8	Chlorides	25-50 Mi. from Battery, Cl 1000-5000 mg/l
Severn, Eng. (Summer)	1.8-4.0	Salinity	From Weston-Super-Mare to Sharpness
Severn, Eng. (Winter)	4.1-17.7	Salinity	Higher River Flows
Thames, Eng.	1.8-2.8	Salinity	10-25 Mi. below London Br. Low River Flow
Thames, Eng.	11.1	Salinity	30 Mi. below London Br. High River Flow
Non-Tidal Rivers	0.025-1.3	Radioactive Tracers	Average Value about 0.1 Mi^2/Day

The mid length dispersion coefficients in Table II were used in the mathematical models to be discussed later.

2. Tidal Flushing

The rate at which a contaminant is transported out of a canal is usually expressed in terms of flushing time. In this section flushing times will be calculated from the dye study data and will be compared to flushing predictions using a "tidal prism" technique.

Time history dye concentrations (Figures 20 - 24, Florida 1973) coupled with respective canal volumes were used to calculate flushing curves (Figure 28). The curves were fitted by standard regression analysis of the general equation for a power function:

$$Y = At^B \qquad \text{(Eq- 6)}$$

Where

$$Y = \frac{\text{Mass of tracer at time } t}{\text{original mass of tracer}} \times 100$$

t = elapsed time since dye dump

A & B are constants

A least squares comparison of difference in flushing rates in paired canals were tested for significant differences (Table IV).

TABLE IV
Comparison of Canal Flushing Rates by Least Square Analysis
Big Pine Key and Punta Gorda, Florida, November 1973

Paired Canals	Probability of having different flushing rate
III VS IV	>80%
III VS V	<50%
I VS II	>99%
I VS III	>99%

As shown in Table IV, flushing rates of the five Florida canals varied considerably. Identical canals (i.e., III and V at Big Pine Key) showed nearly identical rates even though dye injections were made at 50 feet and 100 feet from the dead-end in the respective canals. It is important to note that the elapsed time at which dye began exiting the canals varied from 5.3 hours to 27 hours. The earlier time is associated with an injection 650 feet from the dead-end of a 2000 foot canal and the later time is for an injection 100 feet from the dead-end in a 2500 foot canal. Both canals were at Punta Gorda.

These flushing rates were used to verify mathematical modeling techniques. However, prior to discussing mathematical modeling, a tidal prism method for determining flushing rates will be compared to the dye measurements.

The tidal prism technique for predicting flushing rates is based on the ratio of canal low water volume to the volume of water exchanged during the tidal cycle (tidal prism);

$$M_t = M_o \left(\frac{V_L}{V_L + \alpha T_p}\right)^N \exp\ (-kt) \qquad \text{(Eq- 7)}$$

where;

M_t = mass at time t
M_o = original mass
V_L = volume at low water
T_p = tidal prism volume
α = mixing constant
N = number of tidal cycles
e^{-kt} = mass decay due to photochemical reaction, absorption, etc.

The above equation was solved by assuming a mixing coefficient (assumed to be one, i.e., complete mixing) and a mass decay coefficient (k). Decay coefficient for Rhodamine dye subjected to bright sunlight conditions was found to be -0.0224 per hour (9). Tidal prism flushing rates using this photochemical decay rate adjusted for light penetration are compared to field-measured flushing rates (Table V).

TABLE V
Typical Canal Flushing Times* - Comparing Tidal Prism
Computations and Field Measurements
Punta Gorda and Big Pine Key, Florida
November 1973

		Time for 50% Flushing		Time for 90% Flushing	
Canal	Location	Tracer	Tidal Prism	Tracer	Tidal Prism
I	Punta Gorda	36 hrs.	33 hrs	70 hrs	108 hrs
II	Punta Gorda	14	28	110	97
III	Big Pine Key	27	37	220	125
IV	Big Pine Key	40	40	500	137
V	Big Pine Key	26	37	170	125

*NOTE-flushing times for a conservative contaminant (no decay) will be discussed in the "modeling" section.

Flushing times computed by the tidal prism technique are not entirely predictive of actual flushing times, but their application as a quick approximation should be considered. Since this method simply compares the ratio of the tidal prism volume to the low water volume, it does not adequately describe flushing differences in canals having equal cross sectional areas but unequal lengths.

Dispersion factors and flushing times are two important indices of mixing forces and residence of pollutants in aquatic systems. Time and resources are not always available to field measure these parameters. Therefore, reliable empirical means are extremely valuable. Predictive equations such as the ones discussed in this section do not always prove reliable. However, with judicious screening and verification, mathematical predictions are invaluable. An example from this study is the use of 4/3 law (Eq- 5 and Table II). This method of calculating dispersion coefficients has proven reliable in the context that it was used. If salinity or temperature stratification had been encountered in the canal system, the use of this equation would not have been warranted. Both of these characteristics as well as wind-induced shear velocities tend to increase the apparent dispersion.

FIGURE 11
TRACER STUDY
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

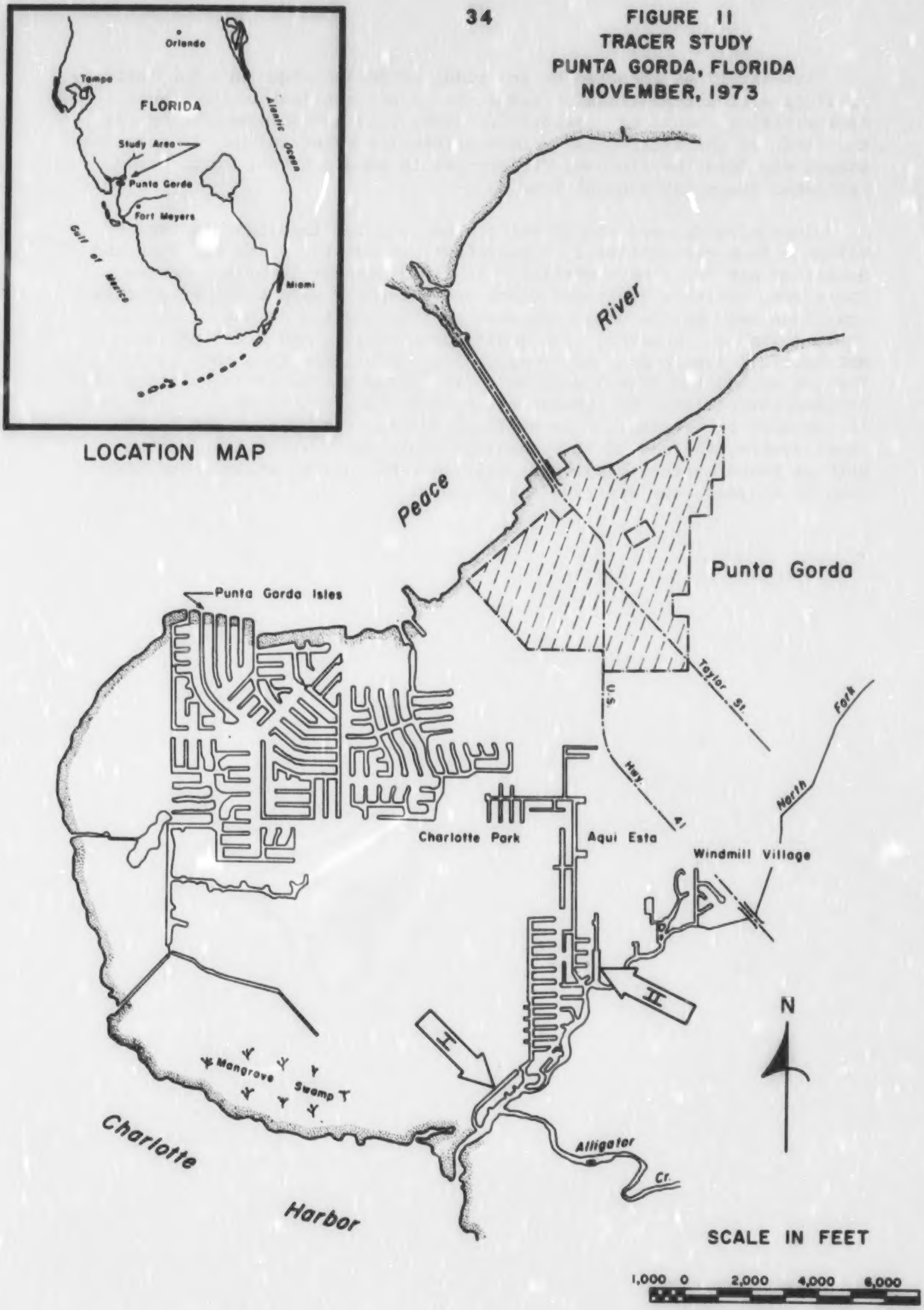

Orlando
Tampa
FLORIDA
Study Area
Punta Gorda
Fort Meyers
Gulf of Mexico
Atlantic Ocean
Miami
LOCATION MAP
Peace
River
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy. 41
North Fork
Charlotte Park
Aqui Esta
Windmill Village
II
I
N
Mangrove Swamp
Charlotte
Harbor
Alligator Cr.
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 12
TRACER STUDIES
BIG PINE KEY
NOVEMBER, 1973

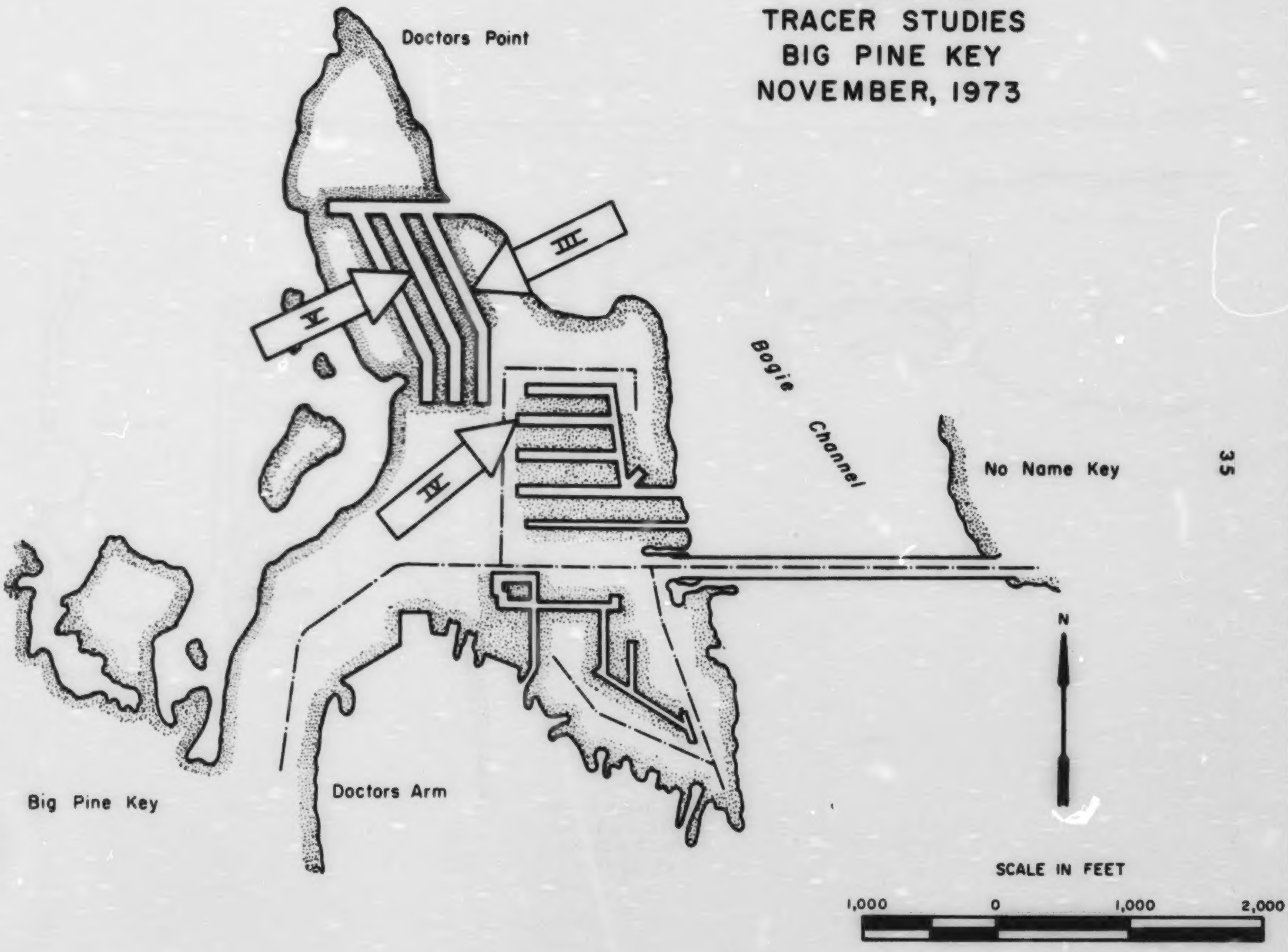

Doctors Point
V
III
IV
Bogie Channel
No Name Key
N
Big Pine Key
Doctors Arm
SCALE IN FEET
1,000
0
1,000
2,000

FIGURE 13
TRACER STUDY
ATLANTIC BEACH
SEPTEMBER, 1974

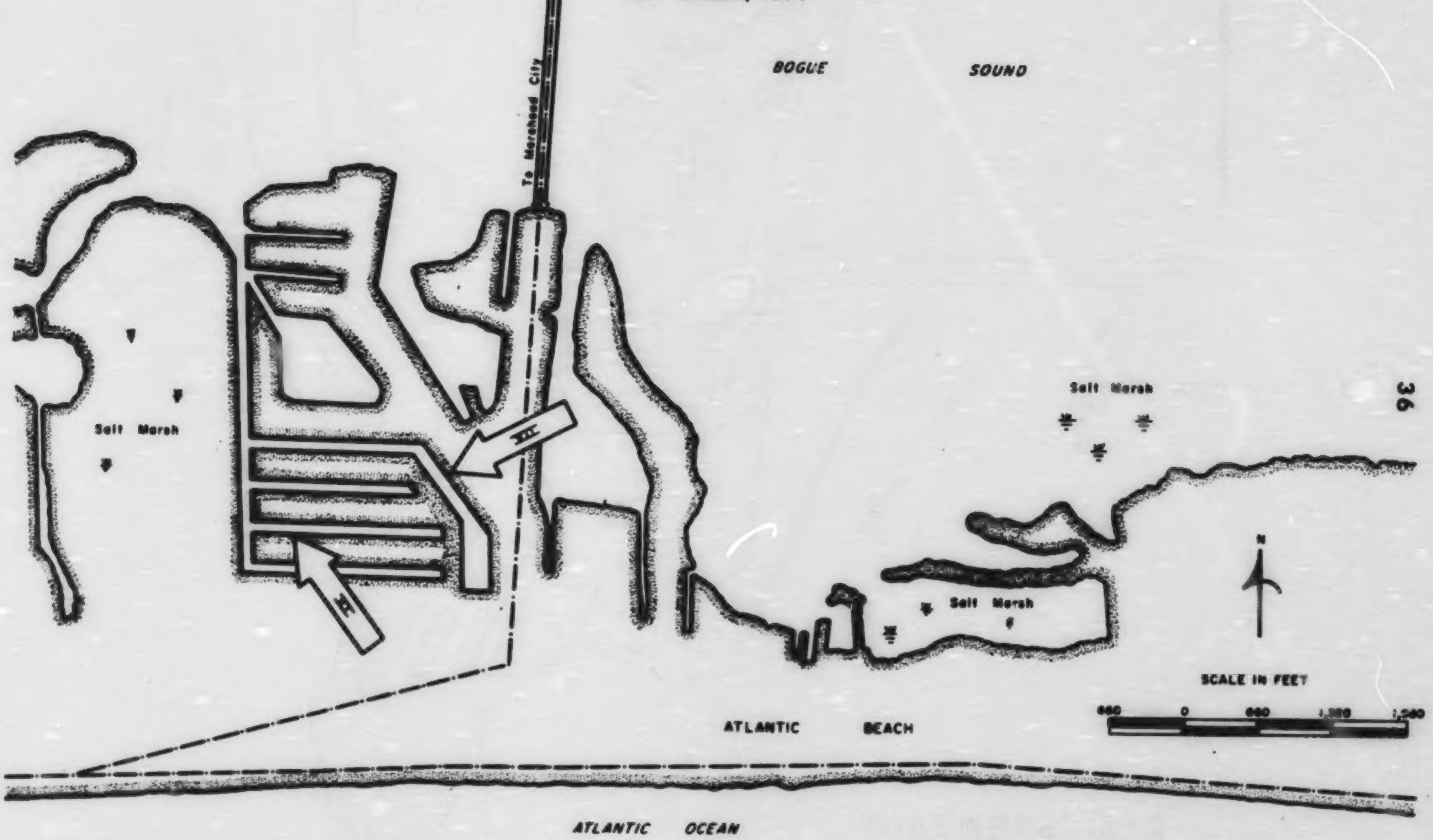

BOGUE SOUND
To Morehead City
Salt Marsh
Salt Marsh
Salt Marsh
III
II
N
SCALE IN FEET
600
0
600
1,200
1,800
ATLANTIC BEACH
ATLANTIC OCEAN

FIGURE 14
TIDAL RECORDING AT PUNTA GORDA FLORIDA
NOVEMBER, 1973

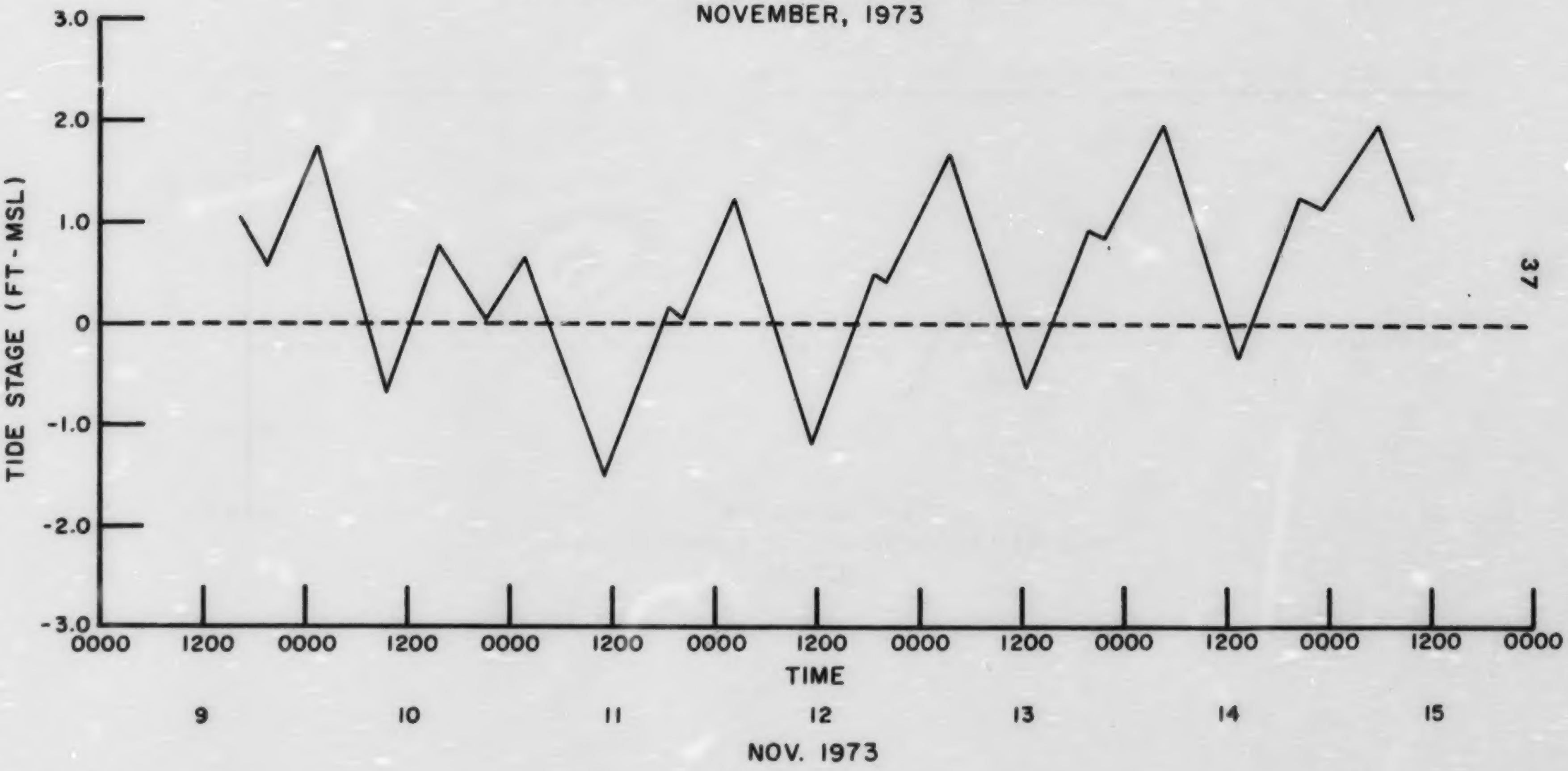


FIGURE 15
TIDAL RECORDINGS AT BIG PINE KEY FLORIDA
NOVEMBER, 1973

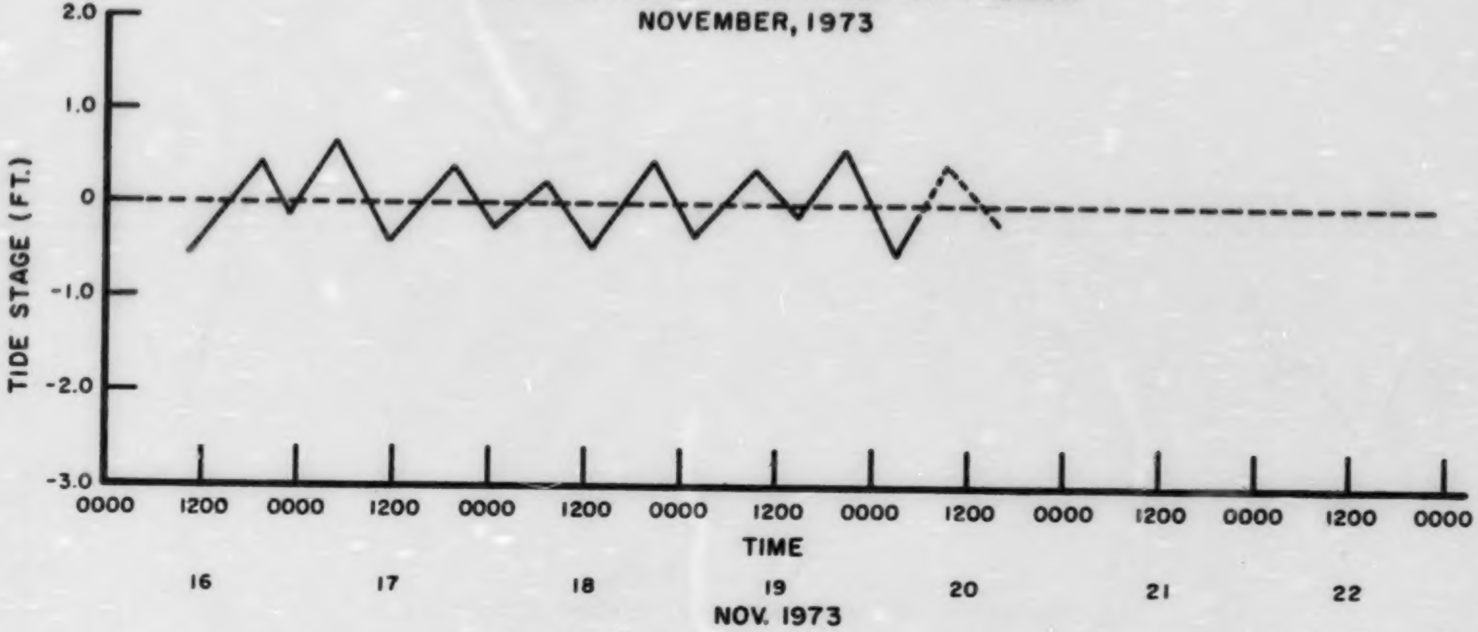


FIGURE 16
TIDAL RECORDING AT ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER,1974

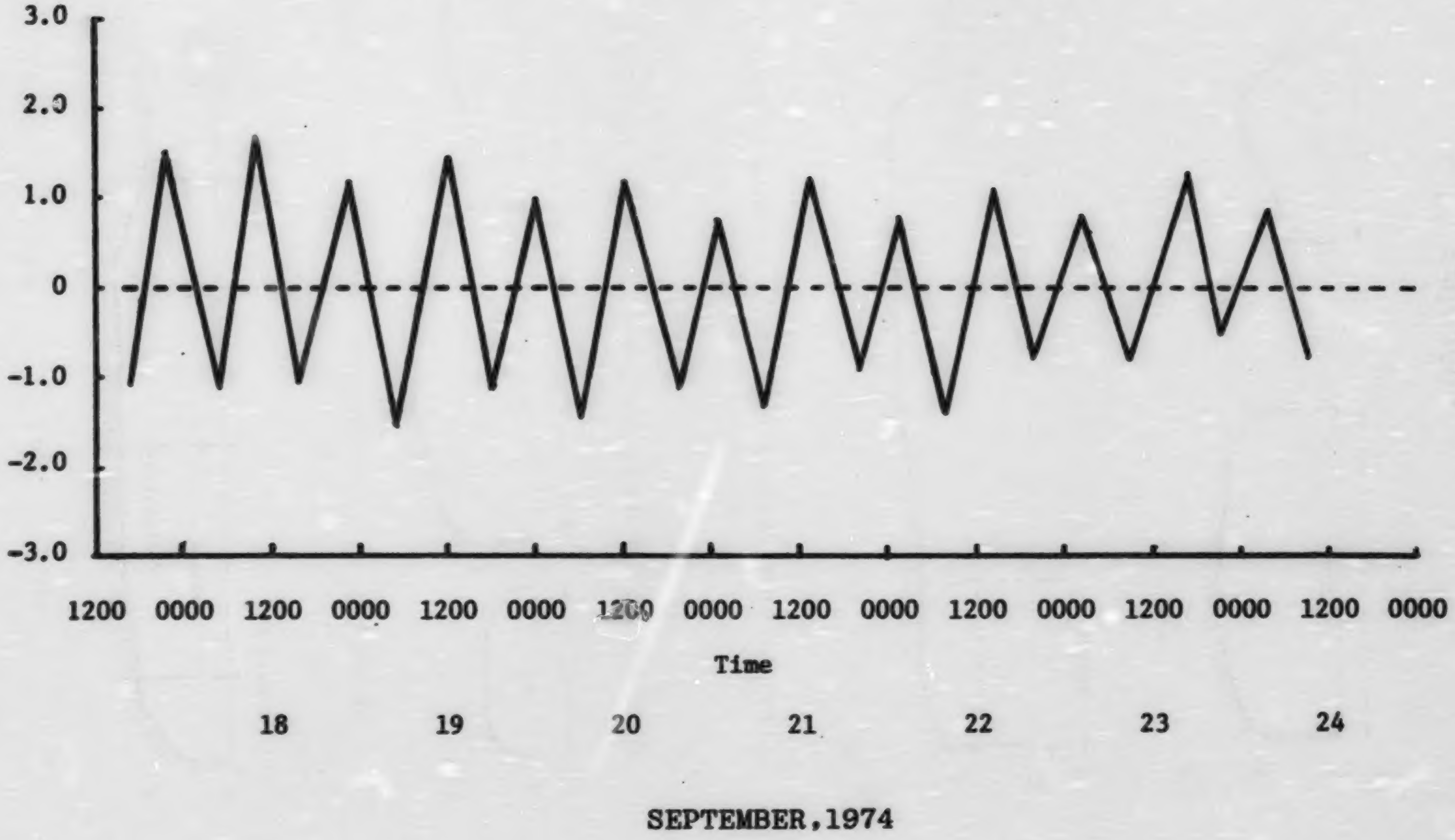
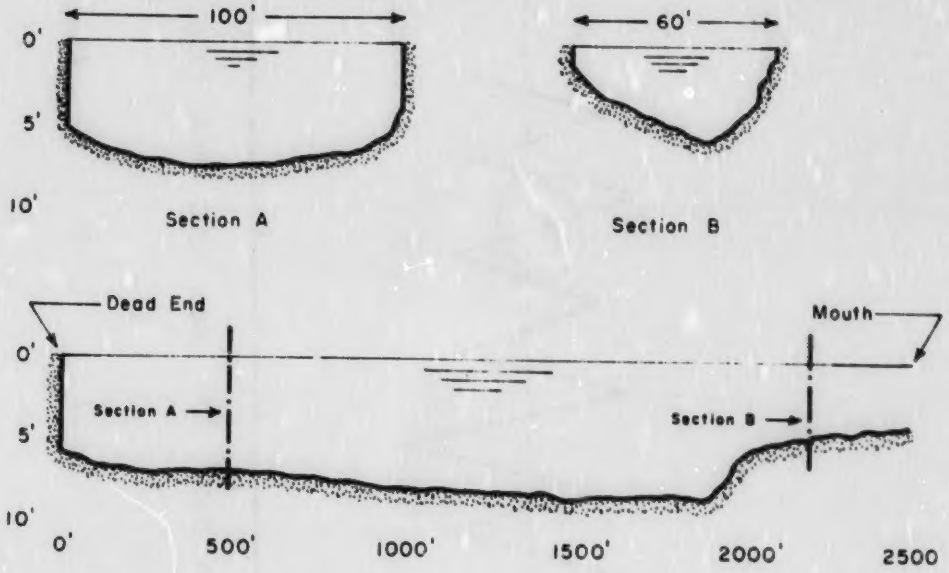


FIGURE 17
TYPICAL LONGITUDINAL SECTIONS AND CROSS SECTIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973


100'
60'
0'
5'
10'
Section A
Section B
Dead End
Mouth
0'
Section A
Section B
5'
10'
0'
500'
1000'
1500'
2000'
2500

Canal #I (100' Wide to 1800' then 60' Wide to 2500')

Canal #II (50' Wide to 650' then 100' Wide to 2000')

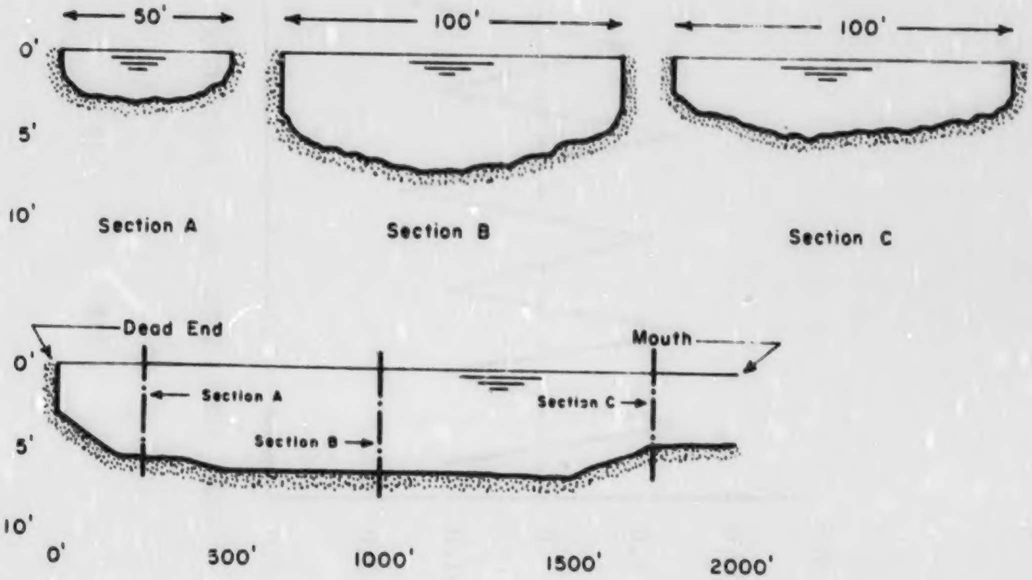
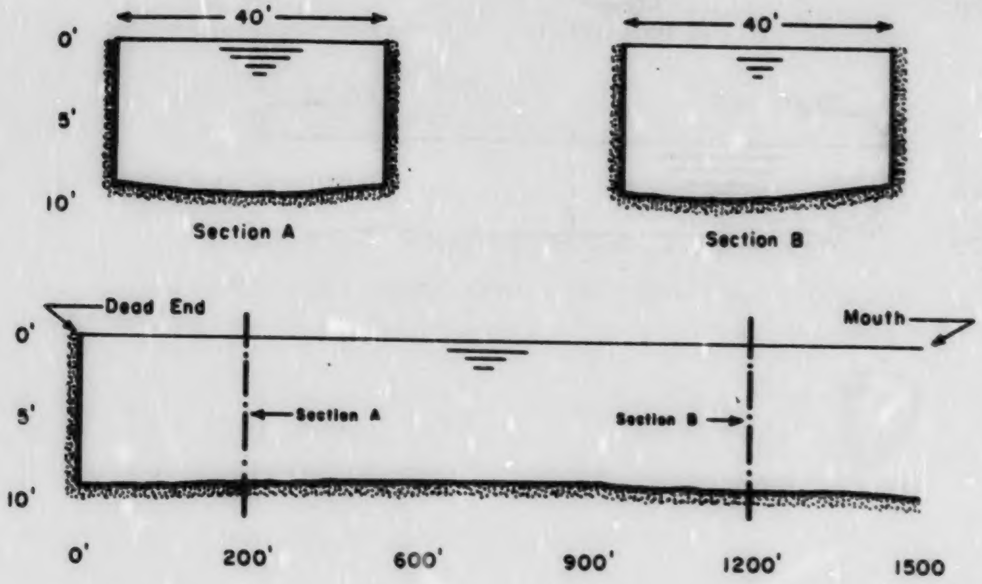

50'
100'
100'
0'
5'
10'
Section A
Section B
Section C
Dead End
Mouth
0'
Section A
Section C
Section B
5'
10'
0'
300'
1000'
1500'
2000'

FIGURE 18
TYPICAL LONGITUDINAL SECTIONS AND CROSS SECTIONS
BIG PINE KEY, FLORIDA
NOVEMBER, 1973


40'
0'
5'
10'
Section A
40'
Section B
Dead End
Mouth
0'
5'
10'
Section A
Section B
0'
200'
600'
900'
1200'
1500

Canals # III & # V

Canal # IV

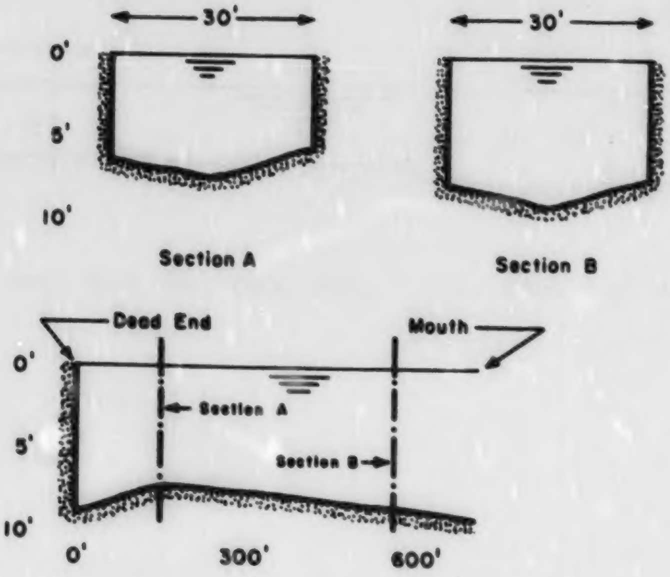
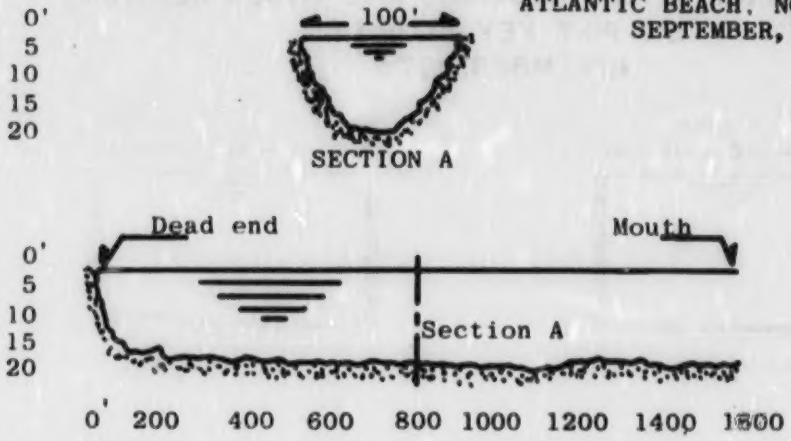

30'
0'
5'
10'
Section A
30'
Section B
Dead End
Mouth
0'
5'
10'
Section A
Section B
0'
300'
600'

FIGURE 19
TYPICAL LONGITUDINAL SECTIONS AND CROSS SECTIONS
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974


0'
5
10
15
20
100'
SECTION A
Dead end
Mouth
0'
5
10
15
20
Section A
0'
200
400
600
800
1000
1200
1400
1600

CANAL # VI

CANAL #VII

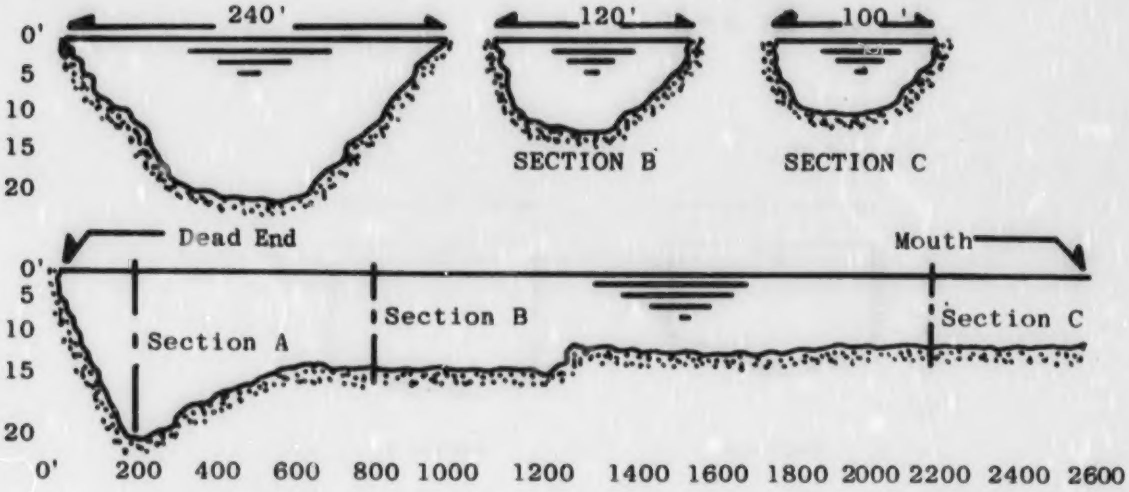
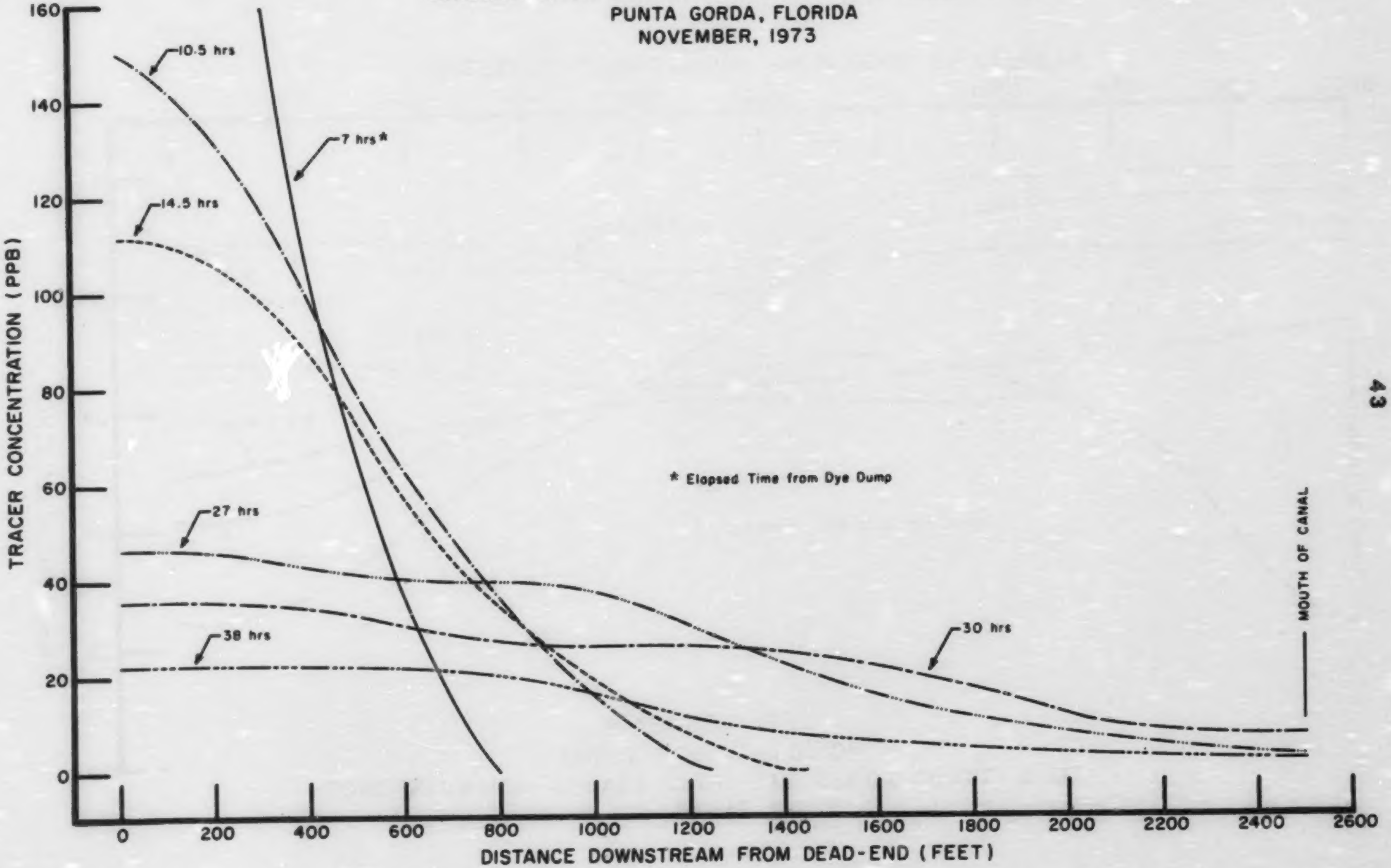

240'
120'
100'
0'
5
10
15
20
SECTION B
SECTION C
Dead End
Mouth
0'
5
10
15
20
Section A
Section B
Section C
0'
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600

FIGURE 20
CONCENTRATION CURVES FROM DYE STUDY CANAL ※ I
PUNTA GORDA, FLORIDA
NOVEMBER, 1973



* Elapsed Time from Dye Dump

FIGURE 21
CONCENTRATION CURVES FROM DYE STUDY CANAL ※ II
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

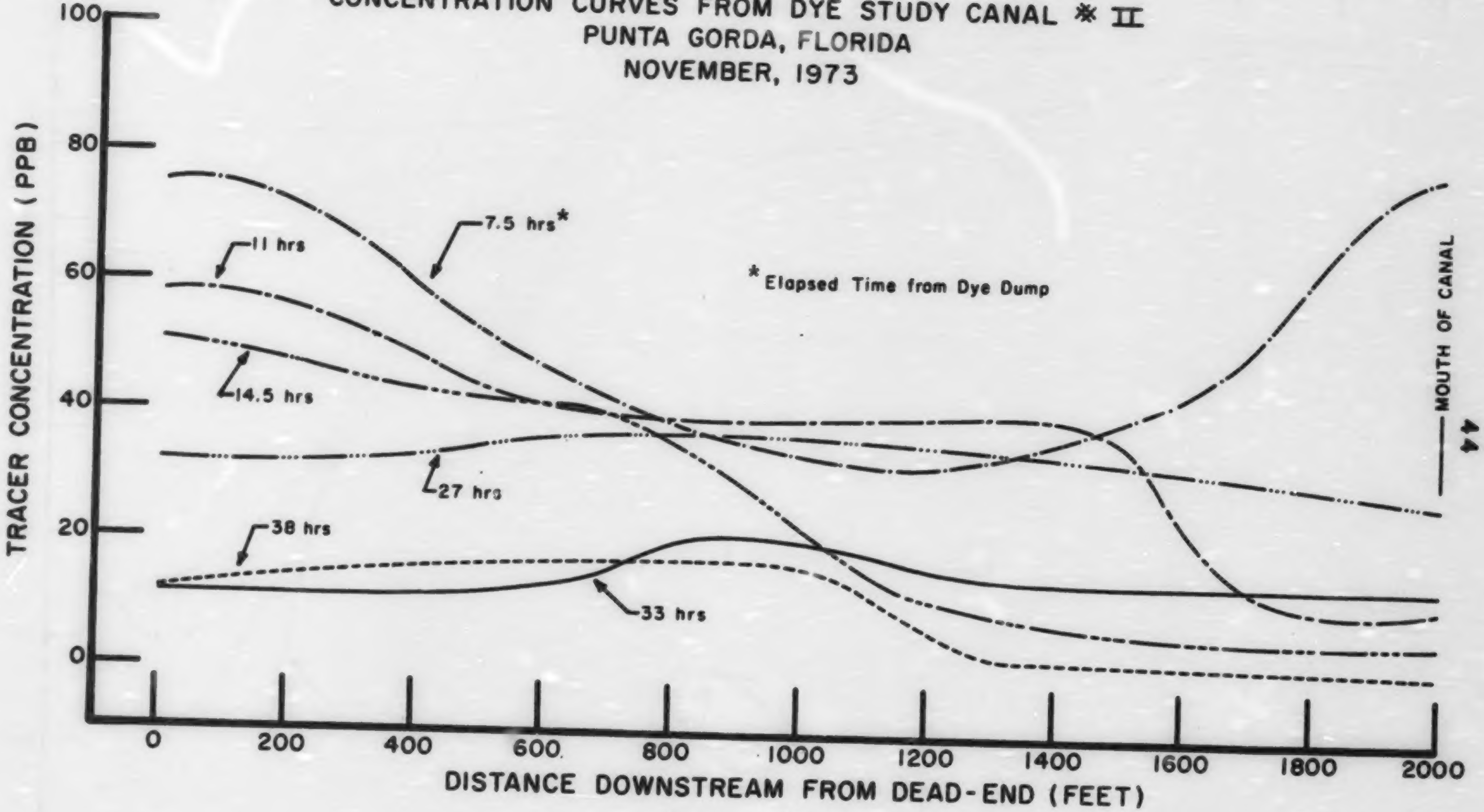


FIGURE 22
CONCENTRATION CURVES FROM DYE STUDY CANAL ✻ III
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

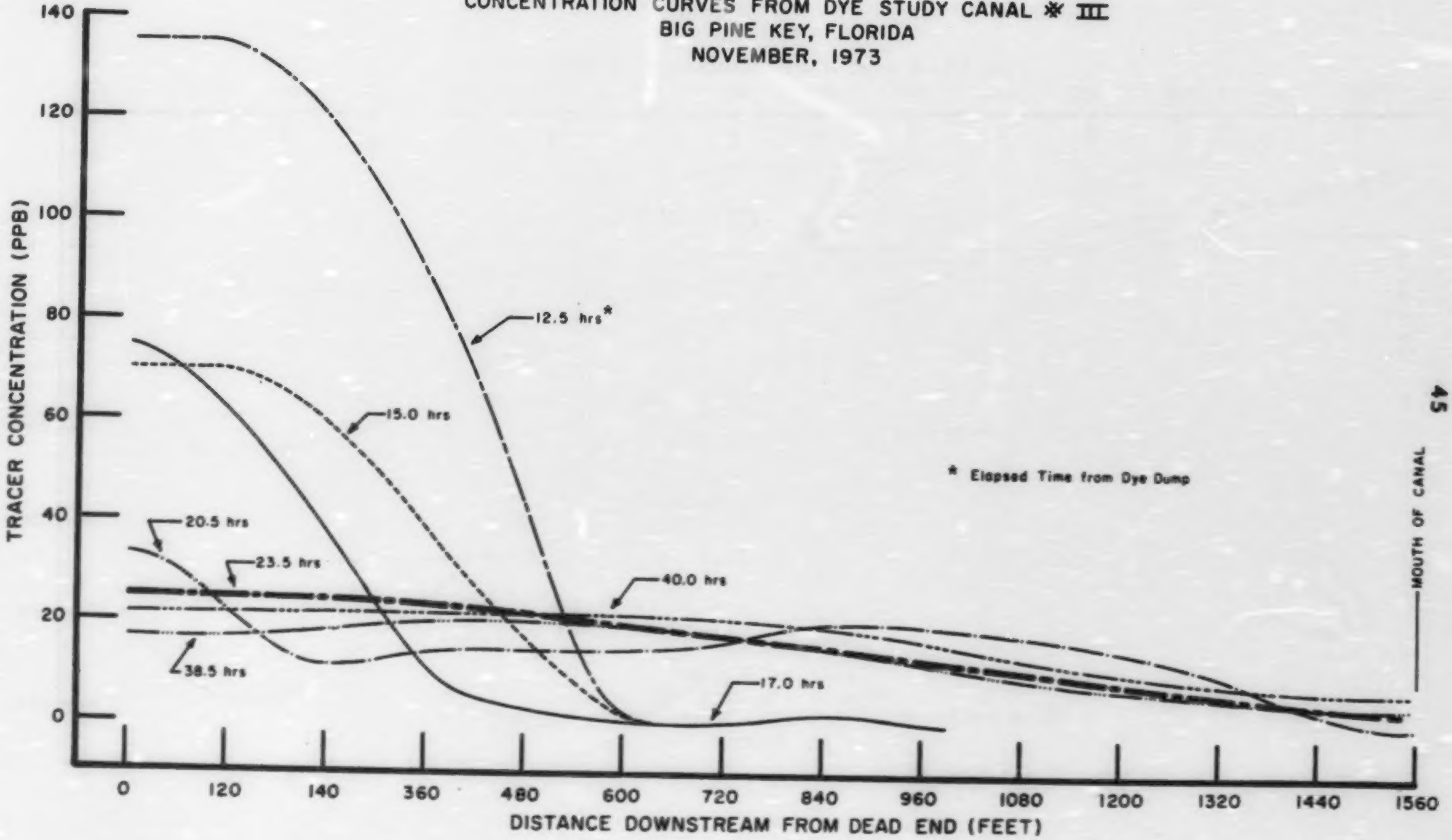


FIGURE 23
CONCENTRATION CURVES FROM DYE STUDY CANAL ※ IV
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

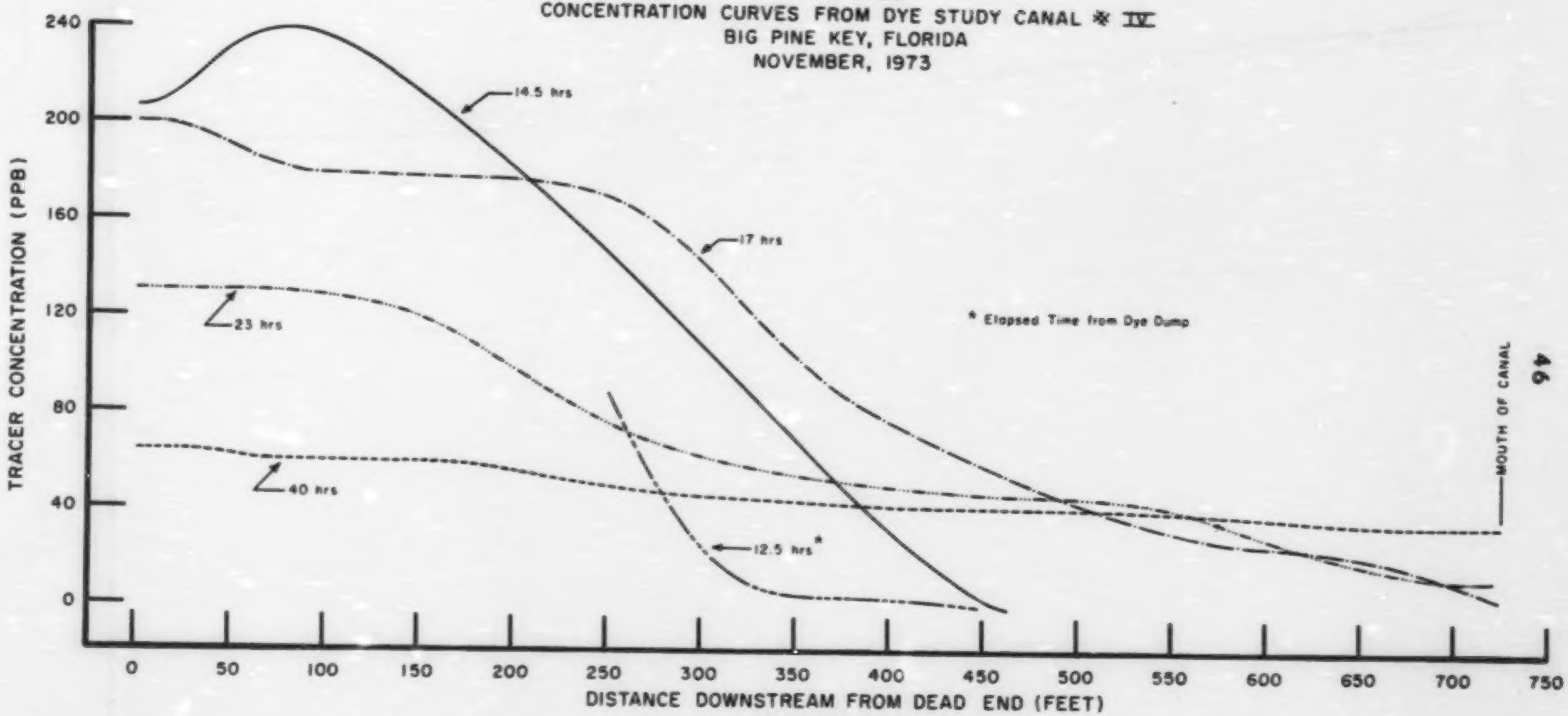


FIGURE 24
CONCENTRATION CURVES FROM DYE STUDY CANAL ※ V
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

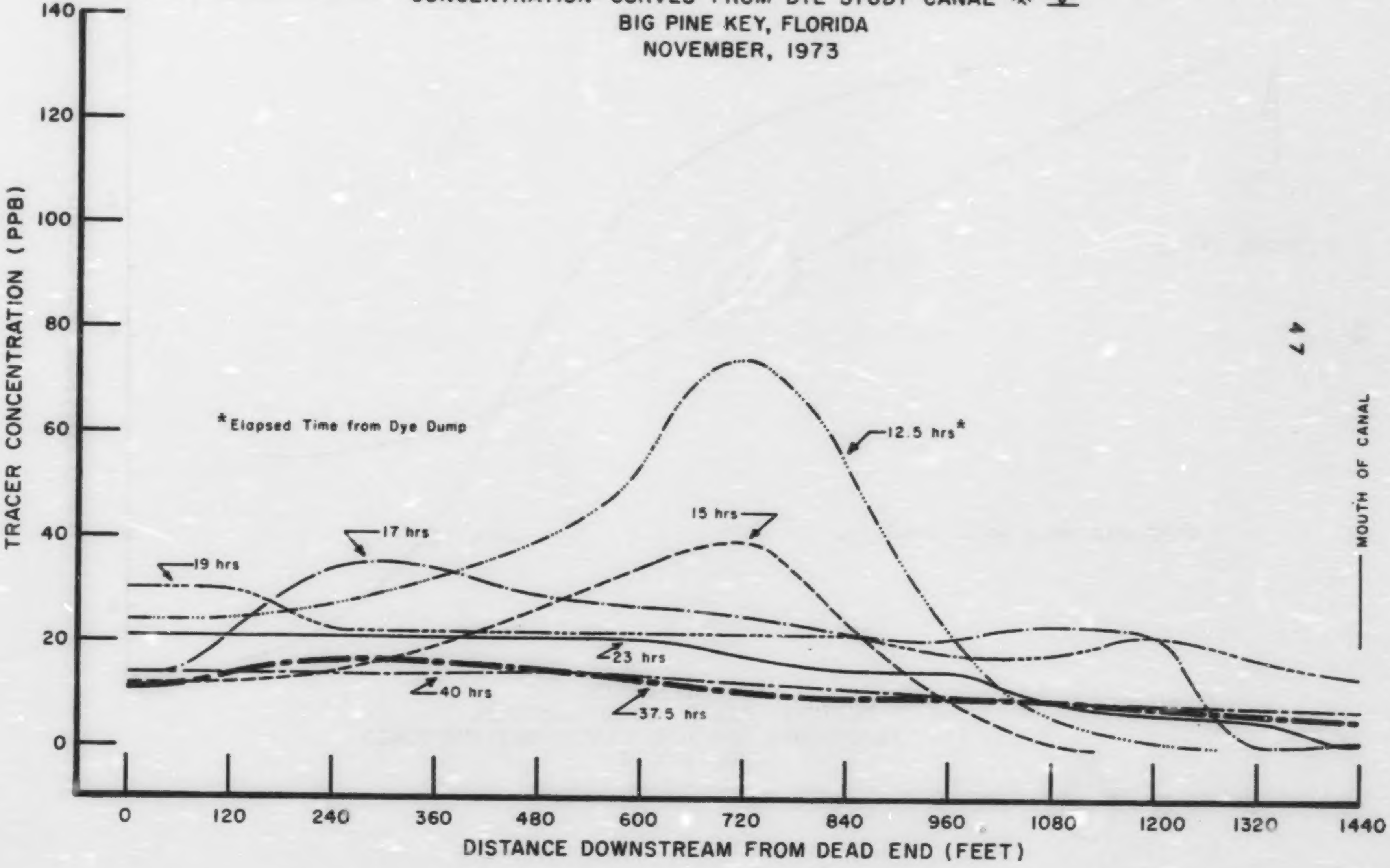


FIGURE 25
CONCENTRATION CURVES FROM DYE STUDY CANAL #VI
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER,1974

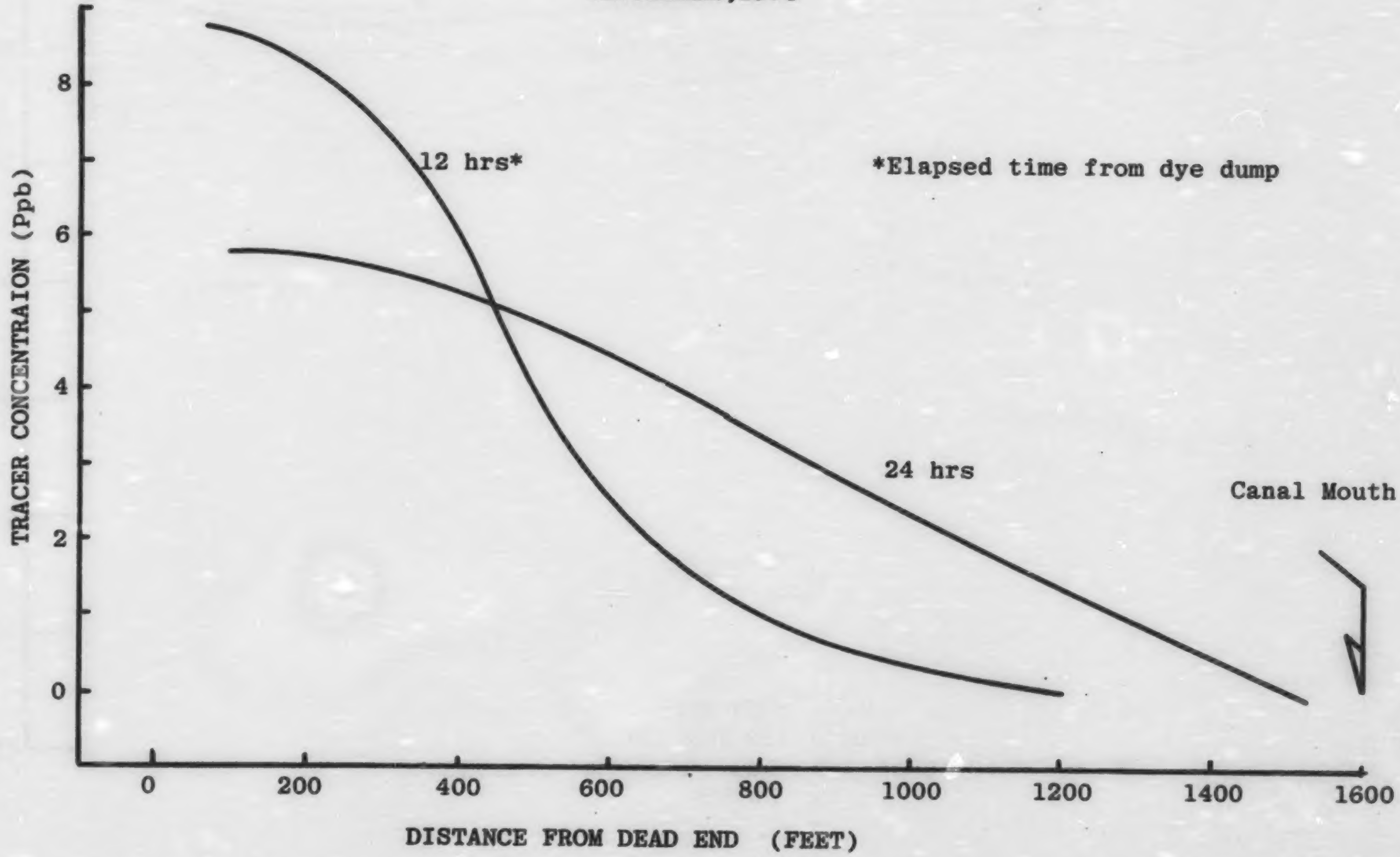
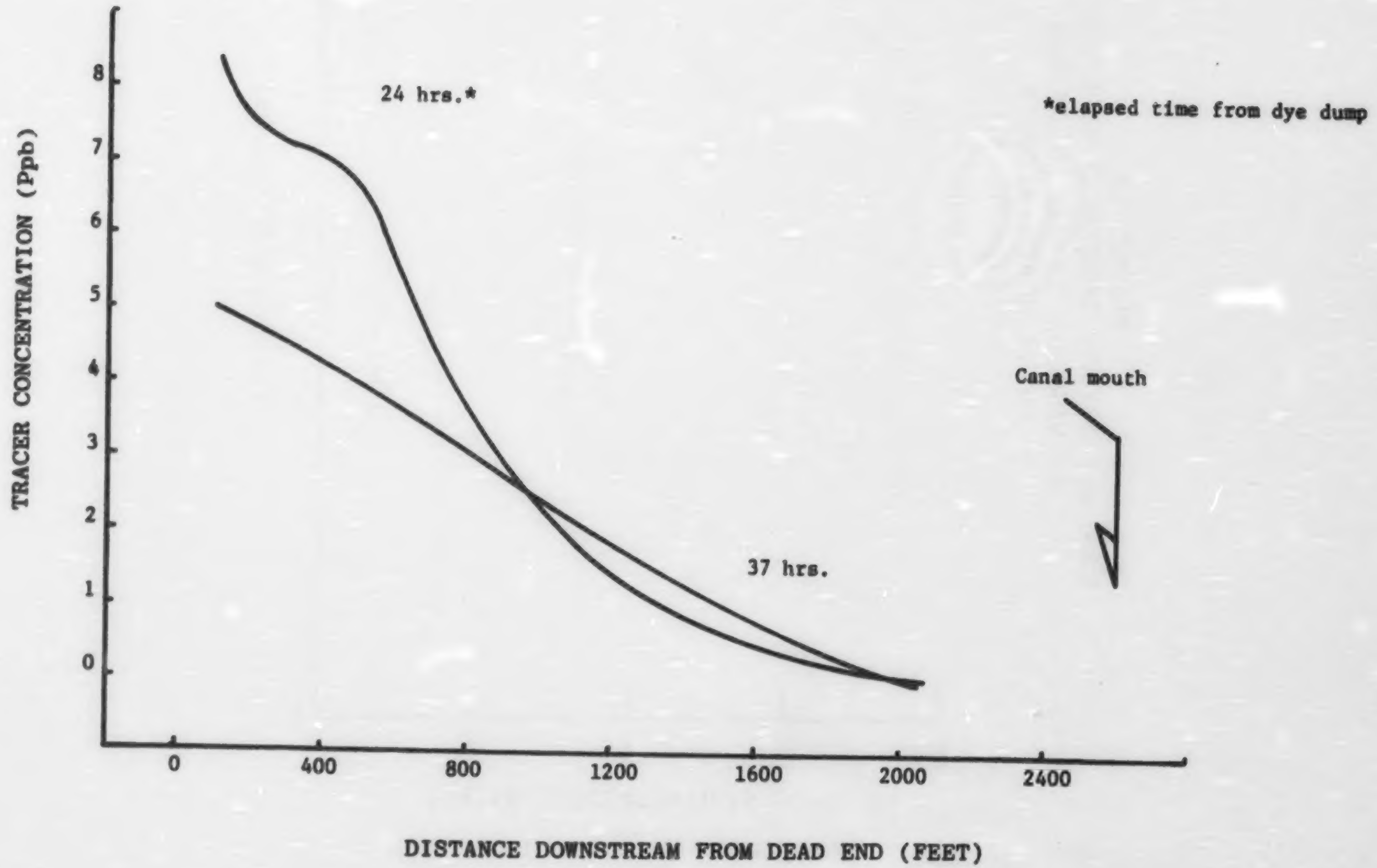


FIGURE 26
CONCENTRATION CURVES FROM DYE STUDY CANAL NO. VII
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974



*elapsed time from dye dump

FIGURE 27
TIME HISTORY OF TRACER CONCENTRATIONS
AT VARIOUS CANAL LOCATIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

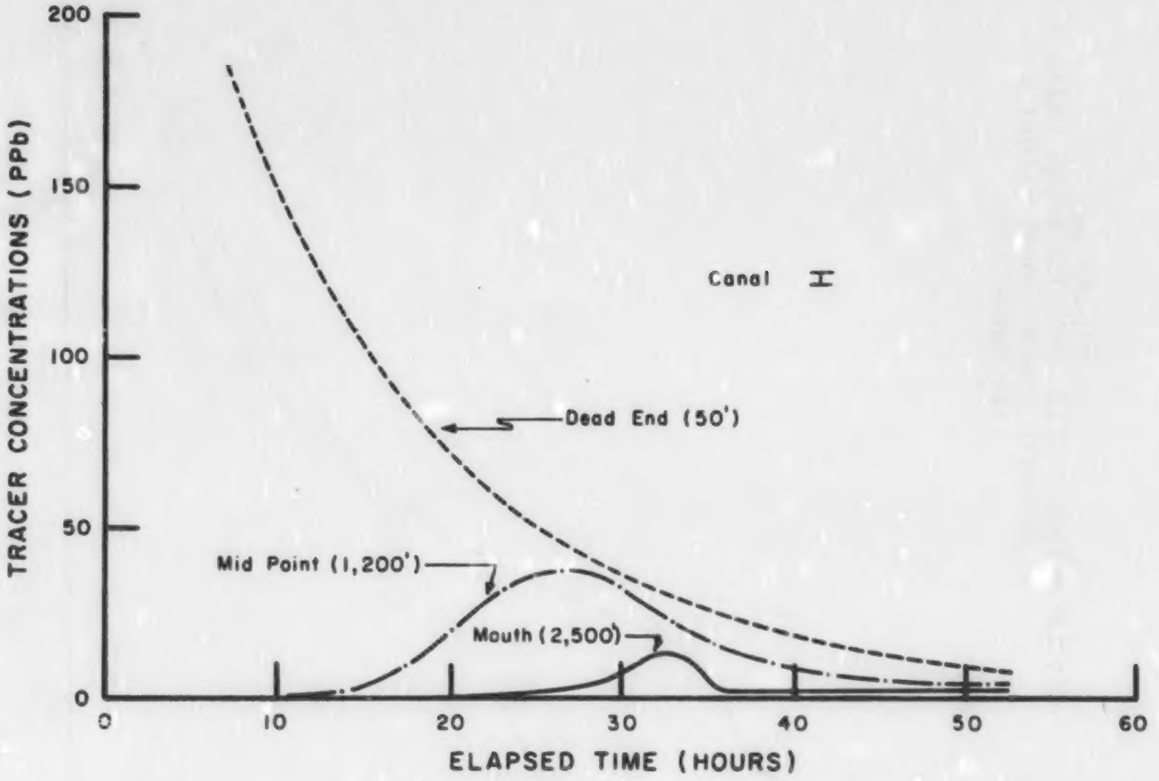
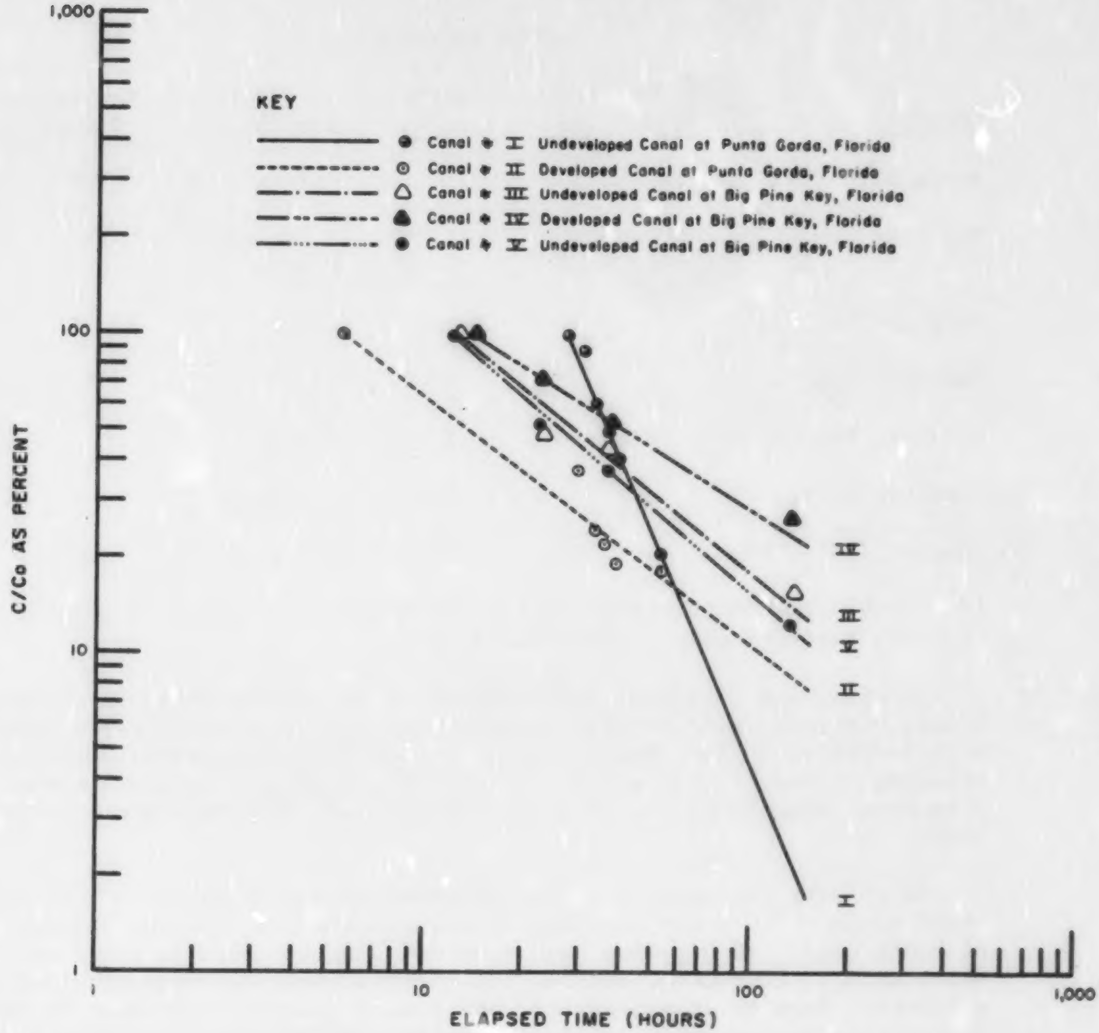


FIGURE 28
CANAL FLUSHING FROM DYE STUDY
BIG PINE KEY & PUNTA GORDA, FLORIDA
NOVEMBER, 1973



B. WATER QUALITY STUDIES

These studies were designed to provide basic water quality data for the selected developed and undeveloped dead-end canal systems. Investigations were conducted at the locations shown and dates indicated in the following Table (VI):

TABLE VI

STUDY LOCATIONS

LOCATION	NOV. 1973	AUG. 1974	SEPT. 1974	Station 1/	Reference Figure
Punta Gorda, FL	X	X		1-7 and A-E	29
Big Pine Key, FL	X	X		8-14 and F & G	30
Marathon, FL		X		15-19	31
Panama City, FL			X	A-I	32
Atlantic Beach, NC			X	1 - 10	33
Spooners Creek, NC			X	1 - 6	34
Emerald Isles, NC			X	1 - 3	35

1/ - Numerical notation indicates primary stations; other notations designate secondary sampling sites.

Studies were conducted over complete tidal cycles except at Emerald Isles, where two sets of grab samples were taken. Water quality samples were collected during periods of slack tide from mid-channel, mid-depth sampling locations. In addition, vertical salinity, temperature and dissolved oxygen profiles (one foot increments) were determined every three hours.

At primary stations, sampling extended through a complete 24-hour tidal cycle. Secondary stations, i.e., alphabetized station designations at Punta Gorda and Big Pine Key, received sampling once or twice at slack tides. Routinely, samples for chemical analyses were obtained with a Kemmerer Sampler at mid-channel and from mid-depth. All samples received appropriate preservation at time of collection and then were returned to our laboratory in Athens, Georgia. Analytical processing (using EPA methods) included determinations for the following constituents:

- Heavy metals (Fe, Mn, Pb and Zn)
- Total Organic Carbon (TOC)
- Nitrogen (TKN, NH_3, NO_2-NO_3, As N)

- Total Phosphorus (T-Phos as P)
- Suspended and Volatile Solids (TSS and VSS)
- Biochemical Oxygen Demand (BOD_5).

Summaries of analysis are provided in Tables VII thru XV and data tabulation in Appendices B and C.

These water quality studies were designed to provide information relative to the following concerns:

- Vertical and longitudinal distributions of temperature, salinity and dissolved oxygen in dead-end canal systems.
- Water quality characteristics of developed and undeveloped dead-end canal systems.

1. Salinity, Temperature and Dissolved Oxygen

Estuaries by definition are mixing zones for sea and fresh waters. Temperature and salinity differences of these waters result in longitudinal gradients often characterized by vertical stratification. Such stratification has pronounced effects on biotic forms, mixing patterns, and subsequently on the dissolved oxygen regime.

During the November 1973 studies, salinity and temperature were essentially constant throughout the water column at all sampling stations at the Punta Gorda and Big Pine Key study areas (Figures 36 through 44). Salinities at mid-depth sampling locations ranged from 28 to 29 ppt and 38 to 39 ppt at the Punta Gorda and Big Pine Key locations, respectively.

Salinity concentrations and temperatures were generally lower at Punta Gorda than at Big Pine Key because of upland drainage area and lower ambient air temperatures. At both Punta Gorda and Big Pine Key, salinities were somewhat greater in the undeveloped (no dwelling units along the canal banks) canals than that recorded in the developed waterways. At Punta Gorda, these differences may stem from the fact that the developed canals (Stations 5-7) were located further upstream and, therefore, merely reflected greater influence from upland drainage. At Big Pine Key, the lower salinities found in the developed canal appeared to be related to lower flushing rates; therefore, freshwater infiltration, whether due to storm runoff or septic tank drainage, would tend to be retained in the system for longer periods. The tidal exchange studies show the developed canal (III) to maintain a 50 percent greater flushing capability.

During periods of higher than normal groundwater tables and increased upland runoff, the salinity regime and biotic communities at the Punta Gorda canals would be expected to shift considerably, while at Big Pine Key salinities would remain relatively stable throughout the year since runoff and freshwater aquifer drainage are minimal.

At Punta Gorda, in November 1973, all stations exhibited a diel DO variation indicative of plant photosynthesis and respiration. Greatest DO concentrations occurred during daylight hours when plant oxygen production exceeded respiration. Minimum DO concentrations were measured during early morning hours when respiration prevailed (Figures 45 and 46, Appendix B-1.1). Surface and bottom DO concentrations generally differed by less than 0.5 mg/l. This stratification, even though small, is evidence of benthic oxygen demands. Absence of adequate light for photosynthesis would exclude the presence of benthic plants.

The Charlotte Harbor Station (4) exhibited pronounced diel DO concentration variations ranging from 7.5 to 4.8 mg/l. This station may be reflecting the respiration requirements of the dense vegetation (Ulva) colonizing the adjoining tidal flats. The channel bottom at the station was fairly well scoured. There were negligible differences between the surface and bottom DO concentrations due to the shallowness of this area (approximately 3 feet deep).

A decrease in DO concentrations was exhibited in the developed canal at Punta Gorda from its mouth (5.0) to its dead-end (3.7). This depression was 1.3 mg/l. For the undeveloped canal, concentration difference from the mouth to the dead end was only 0.2 mg/l; all values exceeded 4.0 mg/l. Dissolved oxygen standard violation in the developed canal was restricted to the dead-end reach.

Dissolved oxygen profiles were run once during the study at five additional stations (A, B, C, D and E) convenient to the study site. These stations are further inland and in some cases had a greater degree of residential development along their banks (Figure 29). DO regimes for these stations fell within the DO ranges demonstrated at the seven previously discussed stations at Punta Gorda (Figures 47-49).

Dissolved oxygen concentrations at Big Pine Key stations are shown in Figure 50 for an undeveloped canal (Stations 8-10) and in Figure 51 for a developed canal (Stations 12-14). DO fluctuations, in general, followed typical diel variation indicative of plant photosynthesis and respiration.

Vertical DO stratification was much more pronounced in the developed canal than in the undeveloped canal. The mid-length station (No. 13) in the developed canal exhibited the greatest degree of vertical stratification with a maximum surface to bottom difference of 1.2 mg/l occurring at 0118 hours on November 18, 1973.

In general, DO concentration decreased in both canals from the mouth to the dead end. The DO concentration at the dead end of the developed canal was usually 1 mg/l lower than a comparable location in the undeveloped canal, although flushing studies show the latter canal to be a better mixed system.

Two additional dead-end stations (F and G) were sampled at Big Pine Key during the DO profile studies. Both stations were located on developed canals (Figure 30). The lowest DO concentration (3.4 mg/l) occurred near the bottom at Station F at approximately the same time (0555 hours) as the lowest DO (4.0 mg/l) recorded at Station 12. The highest DO concentrations at Station F and 12 also occurred concurrently, and were 5.2 and 5.6 mg/l, respectively, at approximately 1700 hours.

Large quantities of marine grasses/algae covered the water surface from the middle to the end of the canal where Station G was located. These marine plants entrapped in this canal had been blown in from Bogie Channel and Big Spanish Channel and were in various stages of decomposition. Other canals at the time of our studies were spared this surface accumulation of vegetation and trash. The floating mat was 1-3 feet thick and gave off septic odors. Dissolved oxygen measurements (Table XVI) indicated that a significant oxygen demand was exerted at both the surface and bottom of the water column at this station.

A study conducted by the Florida Department of Pollution Control (FDPC) in April 1973 (10) documented surface and bottom DO concentrations of 2.3 and 1.4 mg/l respectively at this same location (Station G). At the time of the FDPC study, seagrasses and marine algae along with dead sponges and trash were observed at this station.

Table XVII presents a comparison of DO concentrations at the four dead-end canal stations sampled. Dissolved oxygen concentrations were lower in all three developed canal dead-end stations (12, F and G) than in the undeveloped canal dead-end station (8). Station G exhibited the most severe DO deficits due to decomposition of entrapped marine plant life.

The second study in August 1974 at Punta Gorda revealed the dynamic seasonal effects of freshwater drainage on canal mixing patterns. Canals at Punta Gorda, excavated well below the grade of the natural estuarine bottoms, proved to be a sink for dense saline waters. Severe salinity stratification in the canal systems lead to water quality consequences because of poor vertical mixing. The consequences are readily demonstrated in the dissolved oxygen data (Figures 52 thru 55). At all stations, minimum DO concentrations were below state standards, and in addition, average concentrations violated standards except at the mouth of the undeveloped canal and the Charlotte Harbor stations.

Salinity stratification prohibited the required oxygen transfer and resulted in anoxic conditions in both the developed and undeveloped canals; however, the extent of the anoxic conditions in the developed canals was due to added carbonaceous and nitrogenous oxygen demand in the developed areas.

Two additional dead-end stations (F and G) were sampled at Big Pine Key during the DO profile studies. Both stations were located on developed canals (Figure 30). The lowest DO concentration (3.4 mg/l) occurred near the bottom at Station F at approximately the same time (0555 hours) as the lowest DO (4.0 mg/l) recorded at Station 12. The highest DO concentrations at Station F and 12 also occurred concurrently, and were 5.2 and 5.6 mg/l, respectively, at approximately 1700 hours.

Large quantities of marine grasses/algae covered the water surface from the middle to the end of the canal where Station G was located. These marine plants entrapped in this canal had been blown in from Bogie Channel and Big Spanish Channel and were in various stages of decomposition. Other canals at the time of our studies were spared this surface accumulation of vegetation and trash. The floating mat was 1-3 feet thick and gave off septic odors. Dissolved oxygen measurements (Table XVI) indicated that a significant oxygen demand was exerted at both the surface and bottom of the water column at this station.

A study conducted by the Florida Department of Pollution Control (FDPC) in April 1973 (10) documented surface and bottom DO concentrations of 2.3 and 1.4 mg/l respectively at this same location (Station G). At the time of the FDPC study, seagrasses and marine algae along with dead sponges and trash were observed at this station.

Table XVII presents a comparison of DO concentrations at the four dead-end canal stations sampled. Dissolved oxygen concentrations were lower in all three developed canal dead-end stations (12, F and G) than in the undeveloped canal dead-end station (8). Station G exhibited the most severe DO deficits due to decomposition of entrapped marine plant life.

The second study in August 1974 at Punta Gorda revealed the dynamic seasonal effects of freshwater drainage on canal mixing patterns. Canals at Punta Gorda, excavated well below the grade of the natural estuarine bottoms, proved to be a sink for dense saline waters. Severe salinity stratification in the canal systems lead to water quality consequences because of poor vertical mixing. The consequences are readily demonstrated in the dissolved oxygen data (Figures 52 thru 55). At all stations, minimum DO concentrations were below state standards, and in addition, average concentrations violated standards except at the mouth of the undeveloped canal and the Charlotte Harbor stations.

Salinity stratification prohibited the required oxygen transfer and resulted in anoxic conditions in both the developed and undeveloped canals; however, the extent of the anoxic conditions in the developed canals was due to added carbonaceous and nitrogenous oxygen demand in the developed areas.

Salinity stratification was not apparent in the August 1974 sampling of the Big Pine Key stations. The quantity of freshwater runoff was insufficient to develop the required density gradient for detection. The qualitative differences between DO concentrations in the developed canal (stations 12-14, F and G), undeveloped canal (Stations 8-10), and background (Station 11) were parallel to those found in the November 1973 study (Figures 56 thru 60). The DO suppressions had increased drastically between the two sampling periods as was the case in Punta Gorda. Stations 8, 9 and 10, undeveloped canal sampling locations and station 11, background location, did not violate DO standards; however, with the exception of station 13, all developed canal stations (12, 14, F and G) violated standards (Figures 56 thru 60). In the absence of salinity stratification, DO depressions below standards were attributed to a combination of factors such as higher water temperatures (lower DO solubility) and reduced benthic plant life. Also to be considered is the fact that the developed canal featured more sources of organic carbon and nitrogen plus longer flushing times.

Sea Air Estates at Marathon, Florida (Figure 31) was sampled in August 1974. All canal stations violated state DO standards. This system was extremely deep (maximum of 25 feet) with essentially no development along its banks. Dissolved oxygen suppressions would best be related to poor flushing and possibly to transfer of anexic aquifer waters into the canal system. Likewise, no salinity stratification was evidenced in this system in the Florida Keys (Figures 61, 62 and 63).

Salinity, temperature and DO measurements were taken in canal systems at Atlantic Beach and at Spooners Creek near Morehead City, North Carolina in September 1974 (Figures 33 and 34). The degree of development along the canal banks and the depth of the canal system again proved to be the dominant factor in DO concentrations. Stations 1-5 at Atlantic Beach had DO concentrations violating standards while background stations 6 and 7 exceeded standards (Figures 64 thru 67). Station 8, 9 and 10 in an undeveloped canal system met DO standards (Figures 67 and 68).

Violations of DO standards in the interior canal stations (1, 2, 3 and 4) in the developed canal can be attributed in part to salinity stratification and also in part to oxygen demand for the stabilization of nitrogenous and carbonaceous materials. In light of the high density of the dwelling units and their use of septic tank systems, the source of these oxygen-demanding materials is readily apparent. Figure 69 taken from a January 1973 aerial photograph relates the dwelling unit density to average water column DO concentrations (September 1974).

At Spooners Creek, Stations (1, 2 and 3) violated DO standards while stations (4, 5 and 6) were able to meet or exceed standards (Figures 70, 71 and 72). In general, background stations average DO concentrations were 20% higher than the interior canal stations, 6.5 and 5.4 respectively. Although a salinity gradient existed in the water column in the interior canal stations (1, 2 and 3) no stratification occurred.

2. Biochemical Oxygen Demand

Five-day biochemical oxygen demands (BOD_5) are reported for only the November 1973 studies conducted at Punta Gorda and Big Pine Key, Florida. These analyses were eliminated from the further surveys because of limited manpower and facilities.

At Punta Gorda, average BOD_5 concentrations for all canal stations ranged from 0.8 to 1.8 mg/l with a single exception at Station A where 4.0 mg/l was observed. Station A represented an extreme interior canal location which was well developed relative to Canal II, and was in close proximity to U. S. Highway 41 (Figure 29). No appreciable differences were found between the developed and undeveloped canal stations.

Big Pine Key mean concentrations of BOD_5 in the developed canals were 0.8 mg/l while in the undeveloped system BOD_5 concentrations averaged 0.5 mg/l. These low concentrations indicate that both systems were relatively free of organic pollution.

3. Total Organic Carbon

The two survey periods (November 1973 and August 1974) for the Punta Gorda and Big Pine Key Canals provide a basis for comparing seasonal changes in water quality. In November, the mean total organic carbon (TOC) concentration for Punta Gorda Canal stations was 8.1 mg/l with a range of 7.6 to 8.4 mg/l. These concentrations were nearly doubled in the August 1974 survey (mean of 15 mg/l and range of 14 to 22 mg/l). The seasonal flux in TOC concentrations was not unexpected based on results of detrital transport studies in the Ten Thousand Island region of southwestern Florida (5). During the wet season (about June thru September), surface runoff transported untold quantities of carbon bearing materials that would otherwise remain landlocked during the dry season (October through May) to the estuarine areas. With the coming of the wet season, the two study canals (I and II) were vertically stratified by August as shown in the profile studies.

To facilitate water quality comparisons between stations and canals, when stratified, weighted averages for the entire water column are provided in Table XVIII. The averaging procedure is the following:

$$\frac{Z_S\ C_S + Z_B\ C_B}{Z_T} = \text{weighted average concentration.}$$

where: Z_S = Vertical dimension of surface stratum

Z_B = Vertical dimension of bottom stratum

Z_T = Vertical dimension of water column

C_S = Concentration in surface stratum

C_B = Concentration in bottom stratum

In November, TOC concentrations in the undeveloped waterway (Canal I) averaged about 9 percent greater than those found in the developed system (Canal II). The elevated TOC concentrations observed for Canal I (undeveloped) in November could simply have been related to its position in the Alligator Creek drainage system (Figure 29). At this time, surface land runoff would undoubtedly constitute a minor factor contributing to the TOC regime in terms of allochthonous inputs. More appropriately, the organic carbon pool of the canal systems would be linked to autochthonous sources which include detritus from mangrove forests, salt marshes and possibly septic tank sorption field leachate. The potential for septic systems as carbon sources in the Alligator Creek area is clearly demonstrated in the results of the leachate studies.

In August the TOC picture reversed with respect to the canals. The developed waterway (Canal II) had an average TOC concentration nearly 9 percent greater than that found in the undeveloped system (Canal I). The inflow of freshwater to the developed canal was evident in the salinity studies (Table IX). As noted in the mass exchange studies, the developed canal was importing quantities of organic carbon substantially higher in value than the undeveloped system.

The seasonal changes in organic carbon concentrations were also evident for the canals in the Big Pine Key study areas, although the seasonal trend was reversed from that experienced at Punta Gorda. Higher concentrations were observed in November than in August (average of 4.3 mg/l and 2.1 mg/l, respectively). The seasonal shift in TOC levels was apparently not related to land runoff; November is considered a period of the dry season. Also, land runoff even during the wet season is not viewed as a major source of organic matter simply because of the limited size of the drainage area of Big Pine Key, the nature of the terrestrial plant community, and chemical composition of the soil. Hence, the TOC pool associated with the canal system would basically be dependent on autochthonous sources such as detritus from seagrasses and macroalgae colonizing in the canals. This discussion point is tentatively verified by the mass exchange studies. In both cases Canals III and IV were exporting organic carbon from the system. Thus, a seasonal flux in TOC levels in Canals III (undeveloped) and IV (developed) would probably be related to seasonal trends in marine plant community productivity.

As indicated, greater levels of TOC were observed in the November survey. Likewise, a greater standing crop of benthic plants was recorded in November for the two canals. Table XIX shows the observed seasonal changes in plant biomass to observed TOC concentrations with respect to the two waterways.

At Sea-Air Estates in Marathon, Florida, TOC concentrations for all stations sampled averaged from 1.0 to 1.2 mg/l. Little differences in TOC levels were apparent between canal and background stations (Table XIII). However, the general concentrations of organic carbon found was substantially less than those observed at Big Pine Key during this same period. The relationship between benthic plant biomass and TOC concentrations presented for the Big Pine Key canals can be extended to the Sea-Air Estate system. The Sea-Air Estate canal system was extremely deep (16 to 25 feet) and virtually void of benthic macrophytes and algae. Some macrophytes colonized the vertical slopes of the finger canals; however, no apparent export of TOC was taking place, but rather an import of organic carbon (see mass exchange study data).

Total organic carbon concentrations for canal stations (1 to 5 and 9, 10) at the Atlantic Beach location averaged 3.4 mg/l with non-canal stations (6, 7, 8) averaging 2.7 mg/l. Comparing the two averages, the canal stations were about 25 percent higher in TOC levels. To compare average TOC concentrations for different stages of canal development the following is provided:

Stage of Development	Stations	Avg. TOC Conc. mg/l
Heavily developed canal	1, 2, 3	4.3
Lightly developed canal	4, 5	3.2
Undeveloped	9, 10	2.8
Non-canal	6, 7, 8	2.7

Sources of organic carbon to the canal systems might be better envisioned after reviewing Figure 33 and considering the environmental surroundings of each canal system. The heavily developed canal system is flanked on all sides by commercial and residential units employing septic tank systems for wastewater disposal. Leachate tracing studies in this area demonstrated that effluent from the treatment systems rapidly enter the canals; thus, leachates coupled with storm runoff were sources of the TOC pool of the developed canals. Other sources to the organic carbon pool would be material imported to the system via tidal exchange. In the case of the undeveloped canal, septic tank systems were absent, but the canal was entirely flanked on one side with dense Spartina marsh subject to daily flushing. Organic carbon in the form of plant detritus would thus be entrained from the marsh into the canal's export regime. This was evident in the mass exchange study at station 10.

Total organic carbon concentrations found in the Spooners Creek canals were on the average nearly 40 percent greater than those observed for the non-canal stations (3.0 mg/l and 2.1 mg/l respectively). Spooners Creek remains an active tidal creek which ultimately drains Juncus and freshwater marsh areas. Development by residential units utilizing septic tank systems is relatively light.

Average organic carbon concentrations found in the two Panama City canals were comparable to levels reported for the November survey at Punta Gorda (8.7 versus 8.1 mg/l, respectively). The Hentz Canal maintained an average TOC concentration nearly 20 percent greater than that found in the Woodlawn system and 32 percent higher than background (Stations D, E and F).

The former canal serves residential units utilizing septic tanks. Compared to background concentrations at Stations D, E, and F, similar levels were found in the Woodlawn canal.

4. Nitrogen and Phosphorus

In November 1973, ammonia nitrogen (NH_3-N) concentrations at Punta Gorda were 10 to 110 percent greater in the developed canal stations than those of the undeveloped canals--i.e., 0.09 to 0.17 mg/l vs 0.08 mg/l, respectively. Nitrite-nitrate nitrogen concentrations were two to four times greater in the developed canal than in the undeveloped canal--i.e., 0.027 to 0.042 mg/l vs 0.01 to 0.15 mg/l, respectively. Kjeldahl nitrogen and total phosphorus concentrations were similar in the paired canals. However, Stations A and D and Stations A and B had above background levels of Kjeldahl and nitrite-nitrate nitrogen, respctively. Total nitrogen and total phosphorus concentrations are shown on Figure 73.

In August 1974, the developed canal continued to maintain greater concentrations of nitrogen (NH_3, NO_2-NO_3, TKN). This seasonal change (November to August) produced a sharp increase in the magnitude of the concentrations. For example, ammonia increased more than 20 fold at the developed canal dead-end location (Station 5). The principal environmental factor responsible for the marked increase in nitrogen was vertical salinity stratification. The density gradient (stratification) minimized vertical mixing of the water column; thus, the bottom layer became stagnant and physically isolated in many respects. Biological processes, however, proceeded with continued respirational demands for oxygen. As the dissolved oxygen was depleted, aerobic respiration transitions to anaerobic metabolism. In the latter mode, NO_2-NO_3 and SO_4 ions became the source of oxygen for microbial respiration which ultimately lead to the production of ammonia and sulfide. The microbic community must have a supply of carbon in addition to oxygen. In this case, organic carbon was abundant either as sediment or suspended particulate matter. Also, as the system becomes anoxic phosphorus is released from the sediments. Released phosphorus freely mixes with and enriches the accompanying waters.

The total nitrogen and total phosphorus concentrations (mg/l) found at the dead-end and mid-canal stations are given in the following summary; (also see figures 73 and 74).

Canal Station	Total Nitrogen		Total Phosphorus	
	Nov 73	Aug 74	Nov 73	Aug 74
Background, Station 4	0.3	0.7	0.2	0.3
Canal I (undeveloped), Stations 1 and 2	0.3	2.2	0.2	0.9
Canal II (developed), Stations 5 and 6	0.4	4.3	0.2	1.1

An accounting of the allochthonous inputs (building site and street runoff and septic tank leachates) to the developed canal can be approximated by comparing their nutrient loads to those of the undeveloped canal. The nitrogen and phosphorus concentrations of Canal I subtracted from those of Canal II and then multiplied by the volume of Canal II reveals an excess (as compared to the undeveloped canal) of 109 pounds of nitrogen and 10 pounds of phosphorus in August 1974.

These above nutrient poundages can be converted to population equivalents by the following reported (11 & 12) conversions; 0.04 pounds per capita per day and 0.003 pounds per capita per day for nitrogen and phosphorus, respectively. This conversion yields an accumulation of 2,731 and 3,467 man-days of nitrogen and phosphorus, respectively, in the developed canal. Since there are approximately 25 people occupying this reach of the developed canal, the nutrient accumulation is approximately 100 days or 16 weeks. This period is a reasonable estimate of the period of major rainfall leading to stratification and entrapment of nutrients in the canal systems.

The above mass balance indicates that these accumulated nutrients will either be expelled to the receiving waters once the stratification is relieved or accumulated to some extent in the benthic deposits. This latter event would seem unlikely in view of the low C to N ratios reported in the sediment studies

During the November 1973 Big Pine Key studies, only the ammonia nitrogen concentrations indicated any differences in nutrient levels between developed and undeveloped canals, with averages of 0.07 and 0.04 mg/l, respectively. This difference could be attributed to several factors such as natural variations, lack of analytical preciseness, or even enrichment from septic tank drainage. Total nitrogen and total phosphorus concentrations for the Big Pine Key stations are shown on Figure 75.

In August 1974, the average ammonia nitrogen concentrations for all Big Pine Key stations was 0.10 mg/l which represented a doubling of the November 1973 averages for ammonia (Table VIII and X). As in November, the developed waterway (Canal IV) continued to maintain greater levels of ammonia as compared to the undeveloped canal (Canal III). No seasonal changes were apparent for the other nitrogen forms or for total phosphorus. Total nitrogen and phosphorus concentrations are shown for all stations on Figure 76.

At the Sea-Air Estates location, nitrogen concentrations did not vary significantly between stations within the canal system. Both ammonia and Kjeldahl nitrogen, however, were 20 to 30 percent greater in canal stations than in the non-canal station (Station 19). Also, these two forms of nitrogen were found in substantially lower concentrations than those reported for the Big Pine Key canals. The opposite was true for NO_2-NO_3 nitrogen, which averaged 0.05 mg/l at Sea-Air Estates and 0.01 mg/l at Big Pine Key.

During the studies at Panama City, total nitrogen levels (TKN+NO_2-NO_3) for the Woodlawn waterway were generally higher in values compared to background and the Hentz canal system (Table XII). The higher concentrations probably reflecting the influence of a sewage treatment plant which discharged at a point just north of the Woodland Canal entrance. Nitrogen concentrations decrease landward. In the Hentz canal, total nitrogen concentrations were about 20 percent less than observed for the background area in Pretty Bayou (Station F). The opposite trend was apparent for the Hentz canal. Phosphorus concentrations averaged 3 to 4 times the concentrations found at either the background stations or the Woodland Canal (0.8 versus 0.13 mg/l and 0.03 mg/l, respectively).

Total nitrogen concentration for the Atlantic Beach canal stations (1 to 5) averaged approximately 40 percent greater than averaged background levels found at Stations 6, 7 and 8 (0.29 and 0.21 mg/l, respectively). For the undeveloped canal (Stations 9 and 10), the average for total nitrogen was 0.22 mg/l and was about 14 percent greater than background.

Total nitrogen levels (TKN+NO_2-NO_3) reported for the canal systems appeared related to vertical depths of each waterway and possibly reflects the organic:nitrogen assimilation capacity of each system (Table XX). Also indicated in this table, total nitrogen and organic carbon concentrations follow a distribution related to average DO of the water column. In this case, DO was primarily a function of depth as shown in the DO profile studies. The inverse relationship of depth to organic carbon, total nitrogen, and dissolved oxygen as shown in Table XX indicates the ability of shallower canals, based on better mixing, to assimilate the detrital load.

Kjeldahl and ammonia nitrogen at the Spooners Creek study site averaged 0.25 and 0.06 mg/l for the canal stations (1, 2 and 3). The non-canal station (5) had levels of Kjeldahl and ammonia nitrogen of 0.16 and 0.03 mg/l, respectively. Unlike the developed canals at Atlantic City, the average DO for the lightly developed canals at Spooners Creek were in excess of 5.3 mg/l with a minimum concentration of 3.7 mg/l.

5. Sulfides

Sulfide concentrations at both Punta Gorda and Big Pine Key stations were less than 1.0 mg/l in November 1973. Dissolved oxygen levels were sufficient to keep the sulfur in the oxidized sulfate form. Odors were being produced at the decaying floating marine grasses at Station G in Big Pine Key, but since the mat was at the water column surface, no sulfides were found at the mid-depth sampling location.

6. Metals

Metal analyses included total iron, lead, manganese, and zinc. At both Punta Gorda and Big Pine Key, lead and manganese concentrations were at or below detection limits of 80.0 ug/l and 40 ug/l, respectively. The zinc concentrations were also relatively low: 22 to 50 ug/l and 20 to 60 ug/l at Punta Gorda and Big Pine Key, respectively. Higher concentrations of zinc in both of the sampling areas were found in the developed canals.

Iron concentrations at Punta Gorda were in the range of 150 to 350 ug/l in both the developed and undeveloped canals. Station A at Punta Gorda had a concentration of 3,500 ug/l which was indicative of a high degree of runoff or intrusion of iron-laden ground water. In a report entitled "Ecosystems Analysis of the Big Cypress Swamp and Estuaries" by the EPA in the estuarine areas of Collier County, iron concentrations were reported to be in the range of 100 to 600 ug/l. A peak concentration of 5,600 ug/l was noted in an area where fertilizers and fungicides were used. Ground water iron concentrations were on the order of 900 ug/l in the area.

At Big Pine Key, the iron concentrations generally ranged from <60 to 200 ug/l. Two developed areas (Station 14 and H) had concentrations above these values, 260 and 620 ug/l, respectively. These higher concentrations can be attributed to runoff and leachates from septic tank drain fields.

7. Bacteriological

Samples for total and fecal coliform determinations were collected at one foot below the surface in conjunction with the general chemical sampling. Coliform results for the Punta Gorda, Big Pine Key, Panama City, Atlantic Beach, Spooners Creek and Emerald Isles stations are summarized in Table XXI. With the exception of the Big Pine Key site, all of the canal study areas experienced coliform densities in excess of those permitted by water quality standards. Violations of these excessive coliform densities occurred at the following sampling locations:

SITE	CANAL TYPE AND STATION LOCATION
Punta Gorda, FL	Developed Canal - Dead-End
Panama City, FL	Developed Canal - Dead-End
Atlantic Beach, NC	Developed Canal - Dead-End
Atlantic Beach, NC	Developed Canal - Mid-Length
Atlantic Beach, NC	Developed Canal - Mouth
Atlantic Beach, NC	Developed Canal - Dead-End
Atlantic Beach, NC	Developed Canal - Mouth
Spooners Creek, NC	Developed Canal - Dead-End
Spooners Creek, NC	Developed Canal - Boat Basin
Emerald Isles, NC	Developed Canal - Dead-End
Emerald Isles, NC	Developed Canal - Mid-Length
Emerald Isles, NC	Developed Canal - Mid-Length

Coliform bacteria densities at Big Pine Key in November 1973 were low (<10-220/100 ml). The total coliform bacteria densities in the developed canals (Station 12, 13 and 14) were higher than those in the undeveloped canals (Stations 8, 9 and 10) and at the background station (Station 11).

Salmonella swabs were placed at Stations 1, 2, 3, 5, 5, 6 and 7 at Punta Gorda and at Stations 8, 10, 11, 12, 14 and G at Big Pine Key. However, no Salmonella were isolated at any of the above stations.

Table XXII describes the bacteriological contamination attendant with canal development without adequate wastewater treatment facilities. In all cases, densities were much higher at canal stations than at background stations. In addition, canal age and number of dwelling units (with septic tanks) correlate well with coliform densities, as does location within the canal system. For example, stations AB-1, AB-2 and AB-3 are at the end, middle, and mouth of a reasonably high density canal development. Total coliform densities were 3,400, 400 and 360/100 ml at these respective stations. These densities exceed water quality criteria for both Class SA and SB waters. This area is classified as Class SA waters (shellfish harvesting).

In the case of finger-fill canals, the environment associated with septic tank leachate includes waterways open to public contact swimming, Chesher (13). This report contends that swimming is a direct benefit of finger-fill canals in the Florida Keys. In place of disinfection, we must totally rely on natural attrition of the enteric organisms as they pass from private septic tank and through the sorption field and into the adjacent waterway. The bacteria counts found in our studies should raise some serious questions as to the effectiveness of such a system to protect public health.

Monitoring for the presence of enteroviruses was not conducted during these investigations. However, the potential for enteric virus contamination of waterways subject to septic tank leachate contamination does make this an area of concern for future monitoring efforts. We can ill afford to equate low bacterial indicator densities with the absence of bacterial or viral pathogens.

Table VII
Average Concentrations in the Water Column
Punta Gorda, Florida
November 1973

Station	Depth	Water Temp	Salinity	ph	Residue total NFLT	Residue Vol NFLT	D.O.	BOD$_5$	TOC	NH$_3$-N Total	NO$_2$+NO$_3$-N Total	Kjel-N Total	Phos-P Total	Sulfide Total	Iron-fe Total	Lead Total	Manganese Total	Zinc Total	1/ Coliform Total	1/ Coliform fecal	No. Samples
1	4 ft	22.2°C	28 PPT	7.4	39 mg/1	22 mg/	5.5mg/1	1.0mg/1	8.5mg/1	0.08mg/1	0.010mg/1	0.20mg/1	0.10mg/1	<1.0mg/1	200ug/1	<80 ug/1	<40 ug/1	25 ug/1	871/100ml	14 100/ml	4
2	4	22.2	28	7.5	39	26	5.5	1.4	8.4	0.08	0.010	0.27	0.19	<1.0	225	<80	<40	45	495	11	4
3	3	21.4	28	7.3	52	39	5.7	1.4	8.5	0.08	0.015	0.57	0.16	<1.0	358	<80	<40	30	436	36	4
4	2	21.3	27	7.5	36	23	6.0	1.2	8.2	0.09	0.020	0.32	0.16	<1.0	198	<80	<40	33	203	23	4
5	2	22.5	28	7.4	35	25	4.5	1.1	7.6	0.17	0.042	0.37	0.16	<1.0	275	<80	<40	35	1809	151	4
6	3	22.9	28	7.4	38	20	5.4	1.0	7.9	0.10	0.035	0.32	0.16	<1.0	204	<80	<40	26	310	11	4
7	3	22.0	27	7.4	43	23	5.5	0.9	7.9	0.09	0.037	0.35	0.16	<1.0	158	<80	<40	25	280	10	4
A	2	22.0	28	6.5	200	20	6.0	4.0	8.1	0.17	0.030	0.63	0.48	<1.0	3500	<80	40	22	130	<7	1
B	2	21.5	28	7.5	39	28	6.3	1.6	8.1	0.10	0.030	0.42	0.25	<1.0	280	<80	<40	50	67	<7	1
C	3	21.0	26	7.0	45	20	5.6	0.8	8.0	0.20	0.050	0.42	0.14	<1.0	220	<80	<40	40	200	<7	1
D	5	23.2	28	7.6	51	34	5.4	1.6	8.0	0.10	0.040	0.95	0.17	<1.0	200	<80	<40	50	200	<7	1
E	4	23.6	27	7.4	42	25	4.9	1.6	8.1	0.10	0.050	0.55	0.15	<1.0	145	<80	40	50	100	<7	1

1/ log mean coliform bacteria concentrations, samples taken at 1 foot depth

Table VIII
Average Concentrations in the Water Column
Big Pine Key, Florida
November 1973

Station	Depth	Water Temp.	Salinity	pH	Residue total NFLT	Residue Vol NFLT	D.O.	BOD_5	TOC	NH_3-N Total	NO_2+NO_3-N Total	Kjel-N Total	Phos-P Total	Sulfide Total	Iron-fe Total	Lead Total	Manganese Total	Zinc Total	Coliform Total 1/	Coliform fecal 1/	No. Samples
8	5	26.1	38	8.1	76 mg/1	19 mg/1	5.9 mg/1	0.6 mg/1	3.7 mg/1	0.04 mg/1	0.010mg/1	0.23 mg/1	0.05 mg/1	<1.0 mg/1	78 ug/1	<80 ug/1	<40 ug/1	32 ug/1	<10/100ml	<5/100ml	5
9	5	26.1	38	8.1	75	17	5.9	0.5	3.7	0.04	0.010	0.24	0.03	<1.0	62	<80	<40	34	<10	<5	5
10	5	26.1	38	8.2	70	17	6.1	0.5	3.6	0.04	0.010	0.20	0.03	<1.0	70	<80	<40	26	<10	<5	5
11	2	26.2	38	8.1	71	18	6.4	0.6	3.7	0.05	0.010	0.19	0.03	<1.0	82	<80	<40	32	<10	<5	5
12	5	26.6	38	8.2	76	17	4.9	0.7	4.1	0.07	0.010	0.27	0.04	<1.0	192	<80	<40	35	27	18	5
13	6	26.5	38	8.1	72	14	5.2	0.7	4.3	0.05	0.010	0.24	0.04	<1.0	64	<80	<40	24	32	18	5
14	6	26.5	38	8.2	88	21	5.1	1.0	5.4	0.06	0.010	0.28	0.05	<1.0	260	<80	<40	24	14	7	5
F	4	26.6	37	8.1	61	19	5.1	<0.5	4.7	0.08	0.010	0.25	0.06	<1.0	<60	<80	<40	60	<10	<5	1
G	5	26.2	37	8.0	37	31	3.0	1.3	5.5	0.03	0.010	0.30	0.03	<1.0	<60	<80	<40	50	<10	<10	1
H	2	—	—	7.9	60	21	—	<0.5	2.6	0.08	0.020	0.25	0.01	<1.0	620	<80	<40	50	<10	<5	1
I	3	—	—	7.9	83	28	—	<0.5	3.2	0.10	0.030	0.25	0.01	<1.0	<60	<80	<40	20	<10	<5	1

1/ log mean coliform bacteria concentrations, samples taken at 1 foot depth

Table IX. Average concentrations in water column, Punta Gorda, Florida, August 1974.

Station	Depth (feet)	Water Temperature (^{o}C)	Salinity (ppt)	pH[1]	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Phos-P Total (mg/1)
1	4	31.0	10.7	7.2	6.0	2.0	14.0	0.22	0.68	0.02	0.35
	8	29.8	22.3	NS	NS	NS	15.0	4.88	4.88	<0.01	1.56
2	4	30.6	10.9	7.2	5.0	2.0	13.8	0.17	0.92	0.02	0.35
	8	29.2	22.9	NS	NS	NS	13.0	7.60	8.40	<0.01	2.24
3	3	30.8	8.6	NS	7.0	2.0	15.4	0.12	0.69	0.03	0.32
4	3	31.6	11.4	7.7	7.0	2.0	14.8	0.14	0.70	0.04	0.39
5	4	30.5	6.3	7.1	7.0	4.0	15.0	0.75	1.25	0.06	0.34
	7	28.9	30.2	NS	NS	NS	16.0	8.25	8.80	<0.01	2.16
6	4	30.4	7.1	7.2	5.0	4.0	13.8	0.14	0.66	0.04	0.20
	7	30.1	30.0	NS	NS	NS	22.0	8.85	9.50	<0.01	2.64
7	3	30.4	6.0	NS	8.0	5.0	15.2	0.13	0.64	0.01	0.21

[1] Single observation.

NS = No sample.

Table X. Average concentrations in water column, Big Pine Key, Florida, August 1974.

Station	Depth (feet)	Water Temperature (°C)	Salinity (ppt)	pH[1]	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Phos-P Total (mg/1)
8	5	31.9	35.1	8.1	8.0	3.0	3.4	0.09	0.24	0.01	0.04
9	5	31.8	35.1	8.1	9.0	5.0	2.2	0.10	0.24	0.01	0.03
10	5	31.7	35.3	NS	3.2	1.8	1.8	0.06	0.20	0.01	0.04
11	2	31.3	35.6	7.8	5.0	3.0	2.7	0.11	0.24	0.01	0.04
12	5	32.5	33.7	7.8	5.0	3.0	2.7	0.11	0.24	0.01	0.04
13	4	32.2	35.0	8.0	4.2	2.2	1.8	0.09	0.30	<0.01	0.04
14	4	32.0	35.1	NS	4.0	2.0	1.9	0.09	0.24	0.01	0.03
F	4	32.4	34.9	NS	2.0	2.0	2.3	0.12	0.36	0.01	0.04
G	5	32.2	35.1	NS	3.0	2.0	2.6	0.11	0.40	0.01	0.04

[1] Single observation.

NS = No sample.

Table XI. Average concentrations in water column, Sea-Air Estates, Marathon, Florida, August 1974.

Station	Depth (ft)	Water Temp. (°C)	Salinity (ppt)	pH[1]	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Total Phos. as P (mg/1)
15	8	31.9	35.2	7.8	13.0	9.0	1.0	0.07	0.15	0.04	0.03
16	10	31.6	35.5	7.6	18.0	12.0	1.2	0.07	0.15	0.06	0.03
17	12	31.5	35.5	7.7	16.0	12.0	1.1	0.06	0.17	0.06	0.03
18	5	30.4	36.1	NS	6.0	4.0	1.1	0.05	0.13	0.06	0.03
19	3	29.7	36.8	7.9	5.0	3.0	1.0	0.09	0.18	0.05	0.03

[1] Single observation.

Table XII. Average concentrations in water column, Panama City, Florida, September 1974.

Station	Depth Interval	Water Temp. (°C)	Salinity (ppt)	pH[1]	Residue Total NFLT (mg/1)	Residue Volume NFLT (mg/1)	DO (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	NO_2+NO_3+N Total (mg/1)	Kjel-N Total (mg/1)	Phos-P Total (mg/1)	Coliform Total (100/ml)	Coliform Fecal (100/ml)
A	2	28.6	24.5	7.2	224	41	3.8	8.5	0.02	0.03	0.29	0.04	2,087	354
B	2	28.5	24.8	7.5	306	54	4.6	7.4	0.02	0.02	0.48	0.03	98	44
C	2	28.0	24.6	7.3	230	60	5.2	7.7	0.01	0.02	0.58	0.03	63	25
D	2	28.0	24.7	7.8	223	74	5.5	7.4	0.01	0.01	0.50	0.01	9	2
E	2	28.9	27.8	6.7	298	50	5.4	6.8	0.01	0.01	0.23	0.01	7	2
F	2	27.6	23.7	7.0	243	60	5.3	7.4	0.01	0.01	0.40	0.02	11	2
G	2	28.3	23.1	6.4	219	55	3.2	9.7	0.02	0.01	0.33	0.10	7	2
H	2	28.6	23.3	6.5	273	91	3.7	9.5	0.01	0.01	0.26	0.07	16	6
I	2	28.2	23.7	7.1	268	168	5.1	9.2	0.01	0.01	0.37	0.07	7	1

[1] Single observation.

Table XIII. Average concentrations in water column, Atlantic Beach, North Carolina, September 1974.

Station	Depth (ft)	Water Temp. (°C)	Salinity (ppt)	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Total Phos. as P (mg/1)
1	6	26.7	33.4	8.0	3.0	3.6	0.07	0.29	0.01	0.06
2	6	26.0	33.0	10.0	6.0	5.3	0.09	0.28	0.01	0.05
3	4	26.0	32.6	16.0	7.0	3.9	0.09	0.26	0.01	0.04
4	6	26.6	33.2	19.0	7.0	4.0	0.08	0.31	0.01	0.05
5	5	26.3	32.7	15.0	6.0	2.5	0.09	0.25	0.01	0.11
6	3	25.9	33.1	28.0	8.0	2.3	0.08	0.19	0.01	0.05
7	3	26.1	34.4	26.0	5.0	3.1	0.10	0.17	0.01	0.05
8	3	26.6	34.3	29.0	6.0	2.7	0.12	0.24	0.01	0.07
9	3	25.8	33.2	29.0	6.0	2.7	0.12	0.24	0.01	0.07
10	4	26.4	33.3	25.0	13.0	2.~~9~~ 7	0.07	0.29	0.01	0.07

Table XIV. Average concentrations in water column, Spooners Creek, Moorhead City, North Carolina, September 1974.

Station	Depth (ft)	Water Temp. (°C)	Salinity (ppt)	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Total Phos. as P (mg/1)
1	4	23.6	32.9	25.0	13.0	3.4	0.06	0.23	0.01	0.07
2	3	23.2	32.2	23.0	9.0	3.0	0.09	0.31	0.01	0.06
3	3	24.2	33.0	31.0	13.0	2.5	0.04	0.20	0.01	0.05
4	4	22.5	32.4	NS	NS	NS	NS	NS	NS	NS
5	2	21.9	34.5	21.0	10.0	2.1	0.03	0.16	0.01	0.05
6	4	22.4	32.0	NS	NS	NS	NS	NS	NS	NS

Table XV. Average concentrations in water column, Emerald Isle, North Carolina, September 1974.

Station	Water Temp. (°C)	Salinity (ppt)	Residue Total NFLT (mg/1)	Residue Volatile NFLT (mg/1)	TOC (mg/1)	NH_3-N Total (mg/1)	Total Kjel-N (mg/1)	NO_2-NO_3 as N (mg/1)	Total Phos. as P (mg/1)
1	NS	NS	171.0	145.0	2.8	7.60	7.97	0.01	2.11
2	NS	NS	263.0	174.0	3.6	2.40	5.26	0.01	2.80
3	NS	NS	8.0	8.0	14.5	0.93	0.52	0.01	0.79

Table XVI
Dissolved Oxygen Concentrations (mg/l)
at Station G, Big Pine Key, Florida
November 1973

Depth Below Surface (feet)	2330 Hours 17 Nov.	0820 Hours 18 Nov.	1400 Hours 18 Nov.
1'	1.4	0.7	2.0
2	2.3	0.7	2.8
3	2.7	2.6	2.4
4	2.9	2.6	3.6
5	3.0	3.0	3.2
6	3.9	3.0	2.9
7	4.5	2.6	2.6
8	4.3	2.7	1.7
9	3.3	2.9	0.9
10	0.6	2.4	--

Table XVII
Dissolved Oxygen Concentrations (mg/l) at
Dead End Stations 8, 12, F and G
Big Pine Key
November 1973

Station	Depth Below Surface (feet)	Water Column Location	Time 1800 17 Nov.	0000 18 Nov.	0600 18 Nov.	1200 18 Nov.
8	1	surface	6.1	5.8	5.4	5.8
8	9	bottom	5.9	5.8	5.3	6.2
12	1	surface	5.6	5.2	4.4	5.0
12	8	bottom	5.2	5.0	4.2	4.8
F	1	surface	5.2	5.1	3.5	4.9
F	8	bottom	5.0	4.2	3.4	4.6
G	1	surface	0.5	1.4	0.8	0.4
G	10	bottom	1.1	0.6	2.6	2.6

Table XVIII
Weighted Average Concentrations of Organic Carbon, Nitrogen and Phosphorus In the Water Column - Punta Gorda, Florida
1974

STATION	DEPTH(ft)	TOC	NH_3-N TOTAL	NO_2+NC_3-N TOTAL	KJEL-N TOTAL	PHOS-P TOTAL	WEIGHTING FACTOR
PG-01	4	14	0.22	0.02	0.67	0.36	0.67
PG-01	8	15	4.88	<0.01	4.88	1.56	0.33
	Avg1/	14	1.75	0.02	2.05	0.76	
PG-02	4	14	0.14	0.02	0.63	0.33	0.63
PG-02	8	13	7.60	<0.01	8.40	2.24	0.37
	Avg1/	14	2.90	0.02	3.50	1.04	
PG-03	3	16	0.12	0.03	0.69	0.32	
PG-04	3	15	0.14	0.04	0.70	0.39	
PG-05	3	15	0.12	0.06	0.63	0.18	0.57
PG-05	7	16	8.25	<0.01	8.80	2.16	0.43
	Avg1/	15	3.62	0.04	4.14	1.03	
PG-06	3	14	0.15	0.04	0.67	0.20	0.57
PG-06	7	22	8.85	<0.01	9.50	2.64	0.43
	Avg1/	17	3.89	0.03	4.47	1.25	
PG-07	3	15	0.13	0.01	0.64	0.21	

1/ Average water column concentration, weighted by vertical dimension of the stratified layers.

Table XIX. Seasonal changes in benthic plant biomass and total organic carbon concentrations, Big Pine Key, Florida.

Canal	November 1973		August 1974		
	Average TOC (mg/l)	Average Plant Biomass[1]	Average TOC (mg/l)	Average Plant Biomass[1]	TOC Mass Exchange[2] (kg/day)
III undeveloped	4.6	14.3	2.5	10.4	+0.39
IV developed	3.7	26.0	2.1	4.4	+0.01

[1] Average biomass (g ash-free wt/m^2) for dead-end and mouth stations.
[2] Plus sign (+) denotes net export from canal.

Table XX. Stage of canal development, depth, dissolved oxygen with respect to average total nitrogen levels. Atlantic Beach, NC

Stage of Development	Station	Depth (ft)	DO (mg/l)[1] Range	DO (mg/l)[1] Mean	Total Nitrogen[2] (mg/l)	TOC[2] (mg/l)
Heavy	1	15	0.0-10.6	3.3	0.30	3.6
Light	4	13	0.0-8.7	4.3	0.32	4.0
Heavy	2	11	0.1-11.7	4.1	0.29	5.3
Light	5	10	1.5-8.7	5.1	0.26	2.5
Light	3	8	1.9-9.0	5.5	0.27	3.9
None	9	7	4.7-7.4	5.8	0.24	2.7
None	10	8	4.9-7.4	6.1	0.22	2.7
Non-canal	6, 7, 8	5	4.8-8.0	6.2	0.21	2.7

[1] For water column.

[2] Average for stations.

Table XXI
Coliform Bacteria
Finger Fill Canal Study

STATIONS	LOCATION	DATE	TOTAL COLIFORM		FECAL COLIFORM		EXCEEDS STATE STANDARD	
			MAX.	LOG MEAN	MAX.	LOG MEAN	DAILY MAX. BASIS	MONTHLY AVG. BASIS
	Punta Gorda							
PG-01	Canal Stn.	11/73	2100	871	33	14		
PG-02	Canal Stn.	11/73	800	493	20	11		
PG-03	Canal Stn.	11/73	1200	436	270	36		
PG-04	Background	11/73	600	203	53	23		
PG-05	Canal Stn.	11/73	3900	1809	250	151	X	X
PG-06	Canal Stn.	11/73	800	176	27	11		
PG-07	Canal Stn.	11/73	300	200	13	10		
	Big Pine Key							
BPK-08	Canal Stn.	11/73	10	<10	<5	<5		
BPK-09	Canal Stn.	11/73	<10	<10	5	<5		
BPK-10	Canal Stn.	11/73	<10	<10	<5	<5		
BPK-11	Background	11/73	<10	<10	<5	<5		
BPK-12	Canal Stn.	11/73	90	27	65	18		
BPK-13	Canal Stn.	11/73	220	32	78	18		
BPK-14	Canal Stn.	11/73	45	14	33	7		
BPK-F	Canal Stn.	11/73	<10	<10	<5	<5		
BPK-G	Canal Stn.	11/73	<10	<10	<5	<10		
	Panama City							
PC-A	Canal Stn.	9/74	3000	1787	660	320	X	X
PC-B	Canal Stn.	9/74	125	96	79	37		
PC-C	Canal Stn.	9/74	83	62	50	19		
PC-D	Background	9/74	21	7	2	1		
PC-E	Background	9/74	<7	<7	<2	<2		
PC-F	Canal Stn.	9/74	2	1	20	9		
PC-G	Canal Stn.	9/74	10	6	3	2		
PC-H	Canal Stn.	9/74	21	14	8	5		
PC-I	Canal Stn.	9/74	8	7	<2	1		

STATIONS	LOCATION	DATE	TOTAL COLIFORM		FECAL COLIFORM		EXCEEDS STATE STANDARD	
			MAX.	LOG MEAN	MAX.	LOG MEAN	DAILY MAX. BASIS	MONTHLY AVG. BASIS
	Atlantic Beach							
AB-01	Canal Stn.	9/74	3400	3400	1500	505	X	X
AB-02	Canal Stn.	9/74	400	400	230	113	X	?
AB-03	Canal Stn.	9/74	360	360	170	90	X	
AB-04	Canal Stn.	9/74	106	25	84	18	X	
AB-05	Canal Stn.	9/74	120	27	6	14	X	
AB-06	Background	9/74	10	10	<4	<4		
AB-07	Background	9/74	<4	<4	<4	<4		
AB-08	Background	9/74	—	—	—	—		
AB-09	Canal Stn.	9/74	—	—	—	—		
AB-10	Canal Stn.	9/74	—	—	—	—		
	Spooners Creek							
SC-01	Canal Stn.	9/74	—	—	—	—		
SC-02	Canal Stn.	9/74	—	—	—	—		
SC-03	Canal Stn.	9/74	—	—	145	145	X	?
SC-04	Canal Stn.	9/74	22	28	12	12		
SC-05	Background	9/74	—	—	—	—		
SC-06	Canal Stn.	9/74	76	76	10	10	X	
	Emerald Isles							
EI-01	Canal Stn.	9/74	550	550	400	400	X	X
EI-02	Canal Stn.	9/74	5600	5600	610	610	X	X
EI-03	Canal Stn.	9/74	1000	1000	220	220	X	X

FIGURE 29
WATER CHEMISTRY SAMPLING LOCATIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973 & AUGUST, 1974

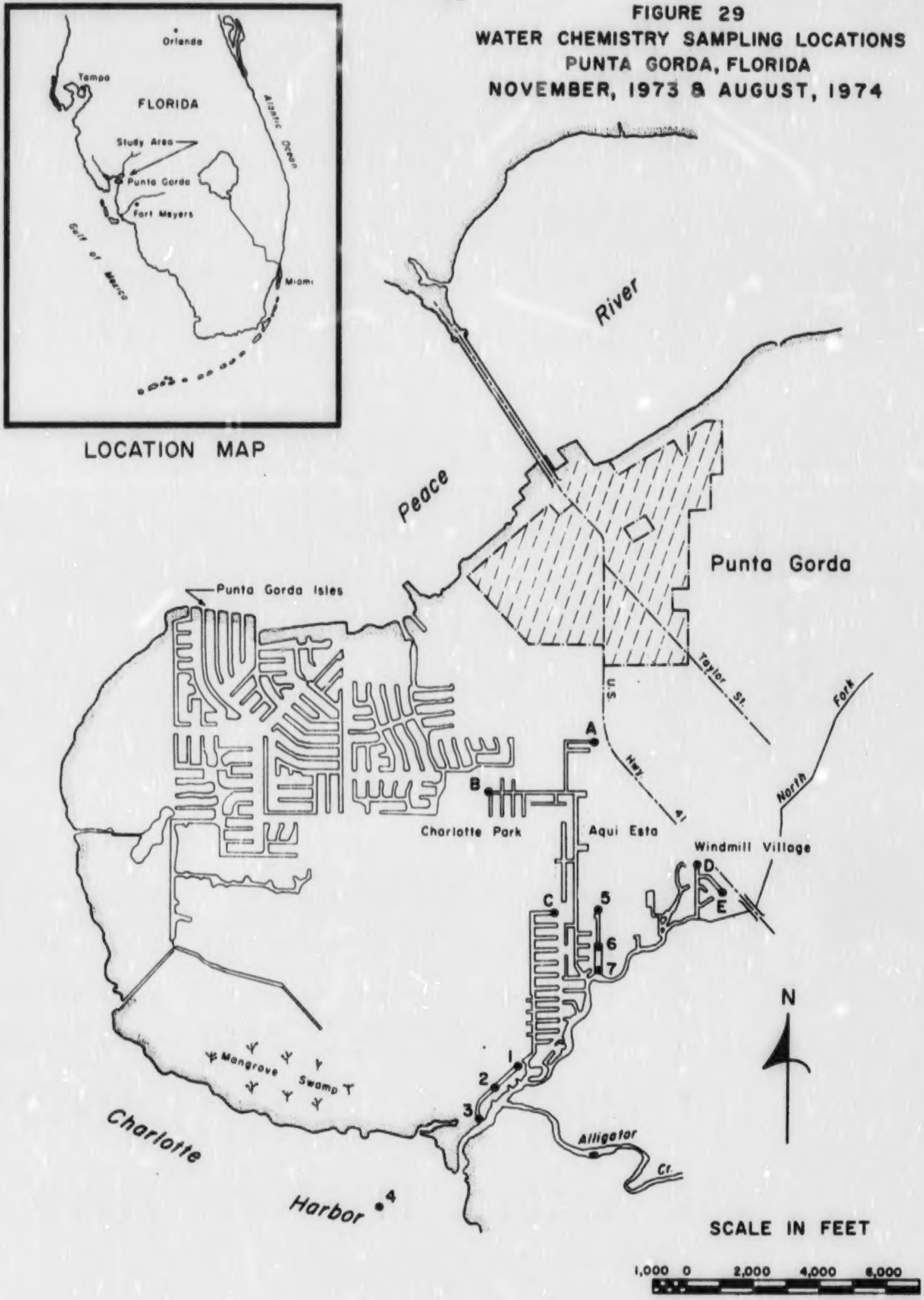

Orlando
Tampa
FLORIDA
Study Area
Punta Gorda
Fort Meyers
Gulf of Mexico
Atlantic Ocean
Miami
LOCATION MAP
Peace
River
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy. 41
North Fork
A
B
Charlotte Park
Aqui Esta
Windmill Village
D
E
C
5
6
7
N
1
2
3
Mangrove Swamp
Charlotte
Harbor
4
Alligator Cr.
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 30
PROFILE SAMPLING STATIONS
BIG PINE KEY
NOVEMBER, 1973 & AUGUST, 1974

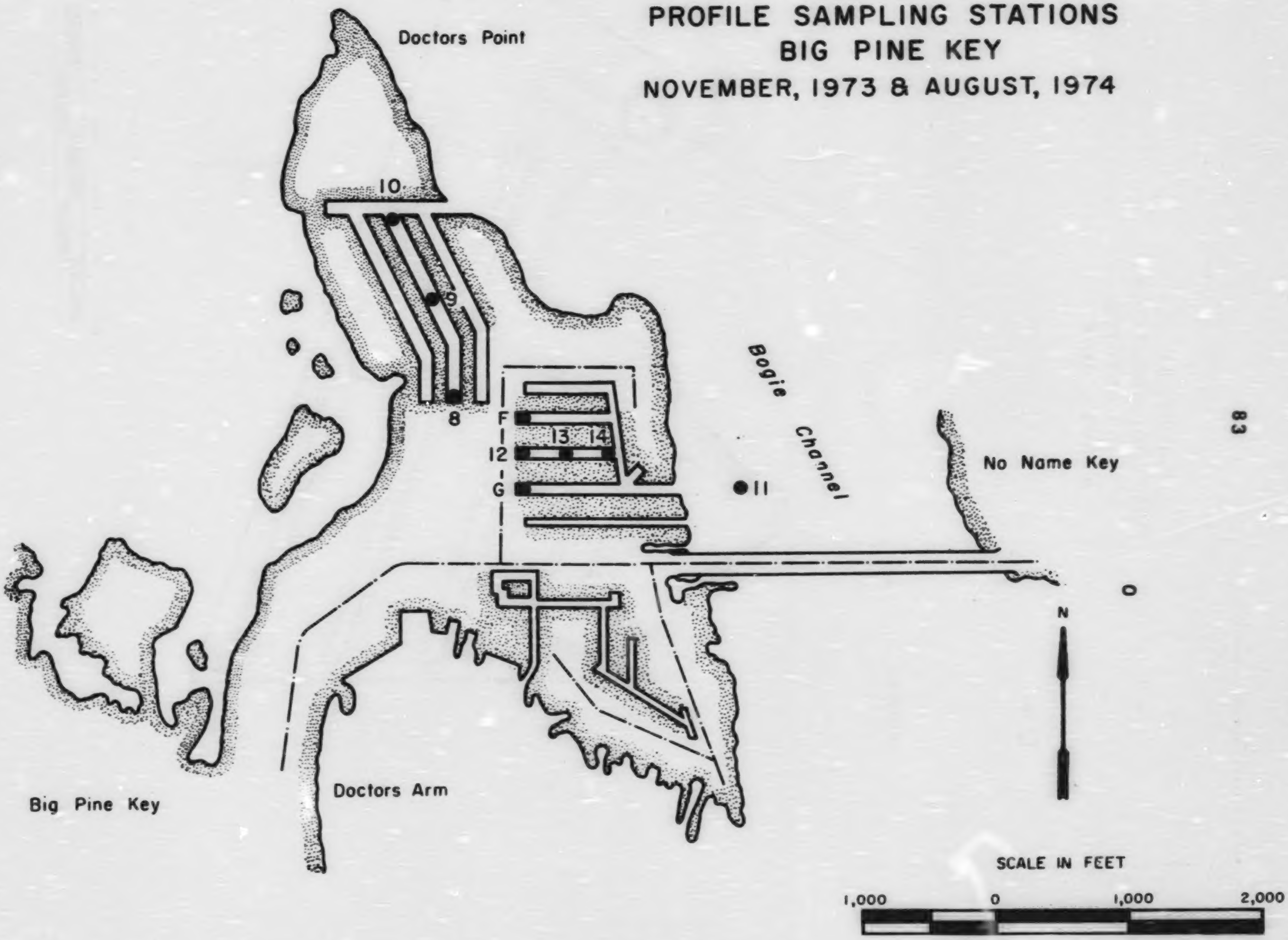

Doctors Point
10
9
8
F
12
13
14
G
11
Bogie Channel
No Name Key
Big Pine Key
Doctors Arm
N
0
SCALE IN FEET
1,000
0
1,000
2,000

FIGURE 31
SAMPLING LOCATIONS
SEA AIR ESTATES
AUGUST, 1974

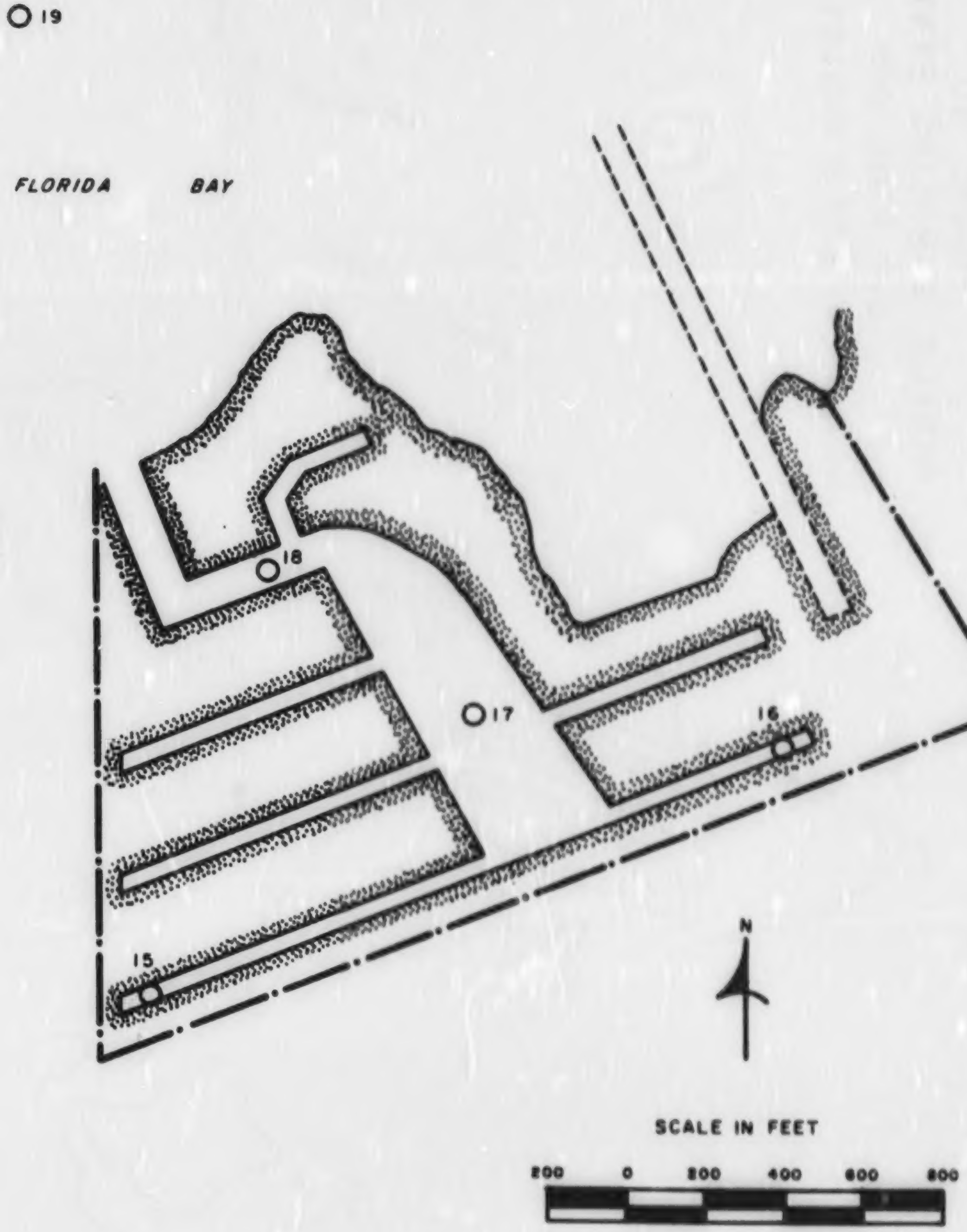
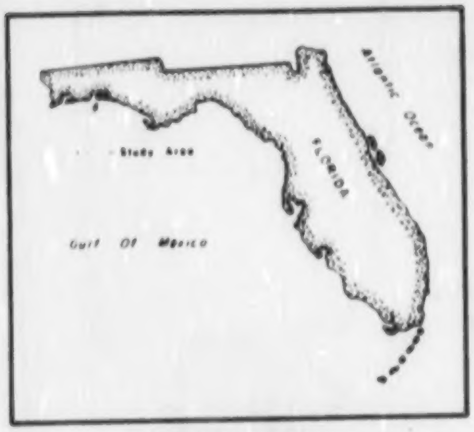
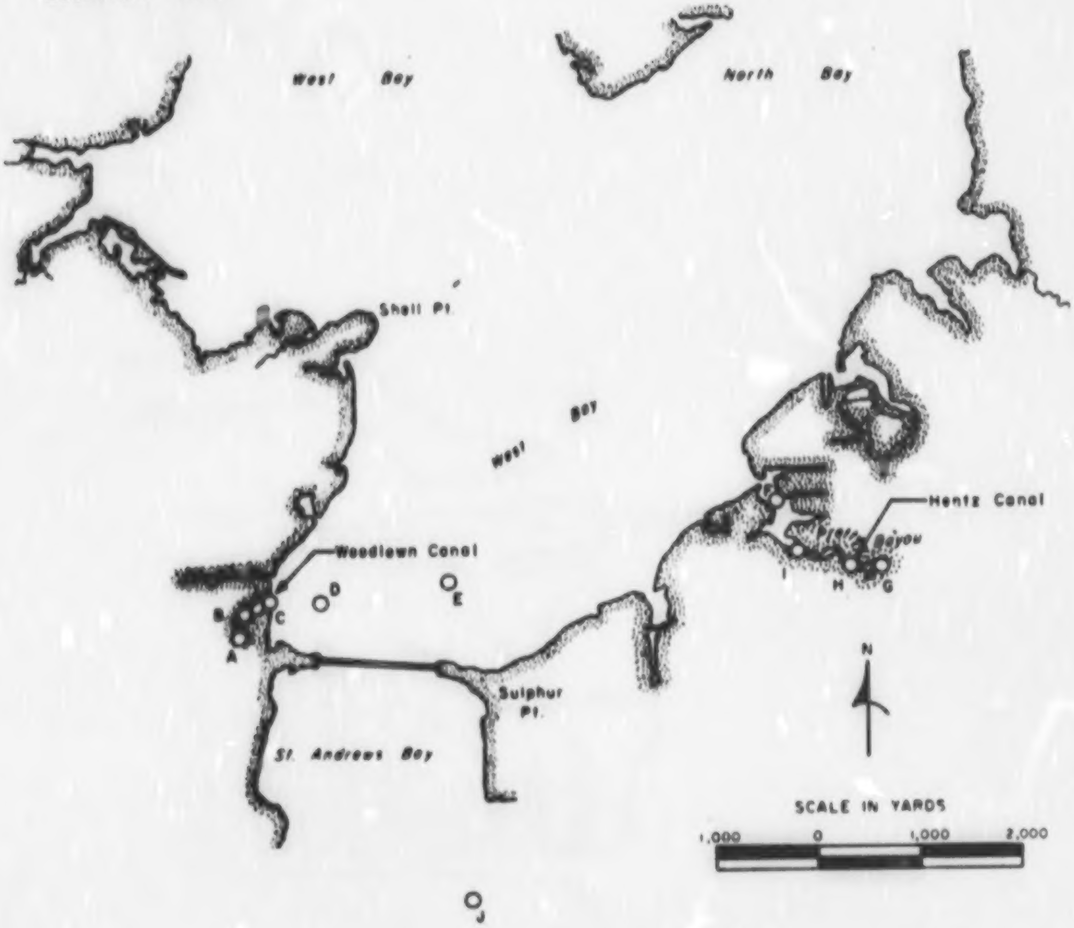

19
FLORIDA BAY
18
17
16
15
N
SCALE IN FEET
200
0
200
400
600
800

FIGURE 32
SAMPLING LOCATIONS
PANAMA CITY, FLORIDA
SEPTEMBER, 1974



LOCATION MAP

Atlantic Ocean
FLORIDA
Study Area
Gulf Of Mexico



West Bay
North Bay
Shell Pt.
West Bay
Woodlawn Canal
Hentz Canal
Bayou
A
B
C
D
E
G
H
I
J
Sulphur Pt.
St. Andrews Bay
N
SCALE IN YARDS
1,000
0
1,000
2,000

FIGURE 33
SAMPLING LOCATIONS
ATLANTIC BEACH
SEPTEMBER, 1974

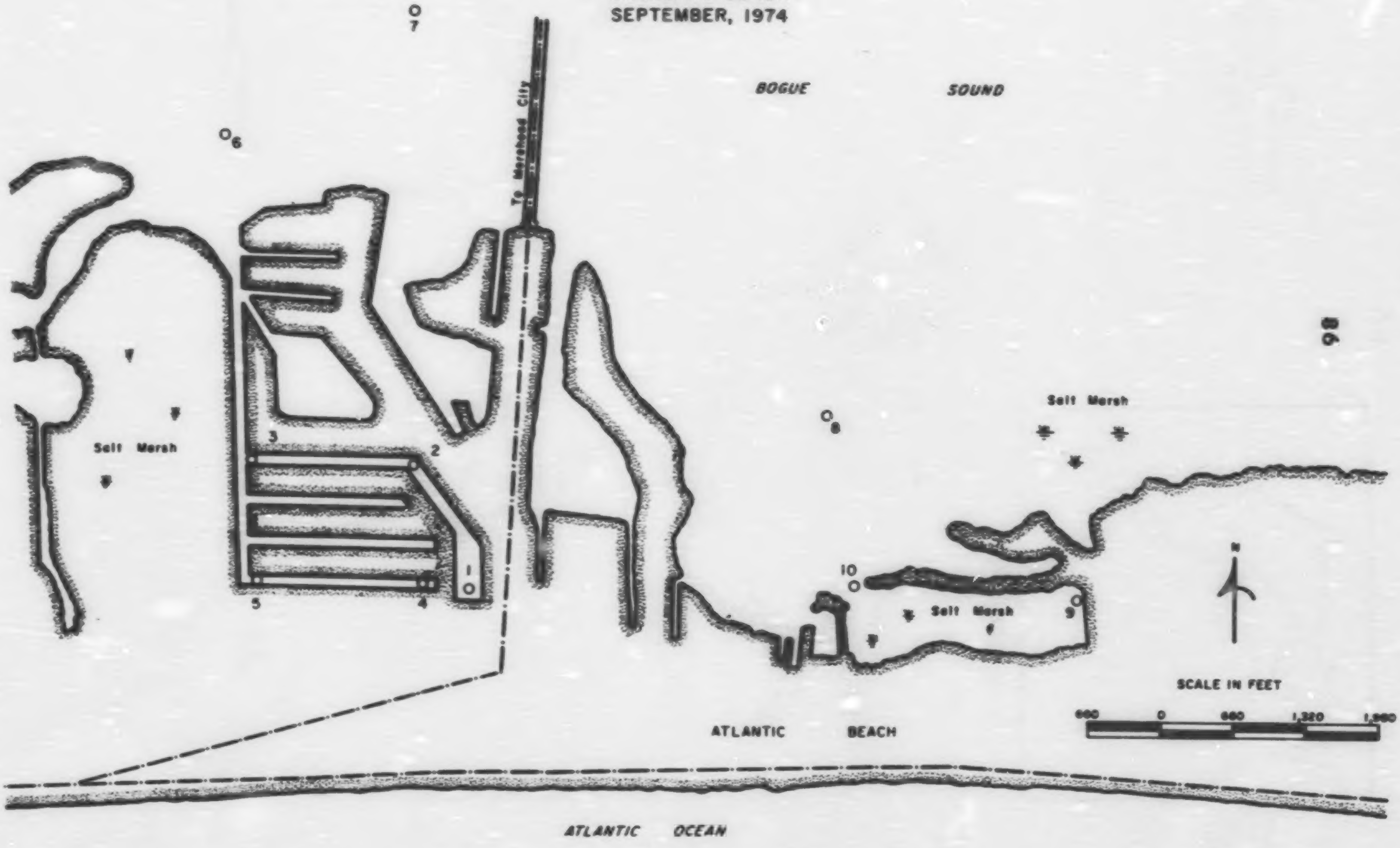

BOGUE SOUND
To Morehead City
Salt Marsh
Salt Marsh
Salt Marsh
1
2
3
4
5
6
7
8
9
10
N
SCALE IN FEET
660
0
660
1,320
1,980
ATLANTIC BEACH
ATLANTIC OCEAN

FIGURE 34
SAMPLING LOCATIONS
SPOONERS CREEK
SEPTEMBER, 1974

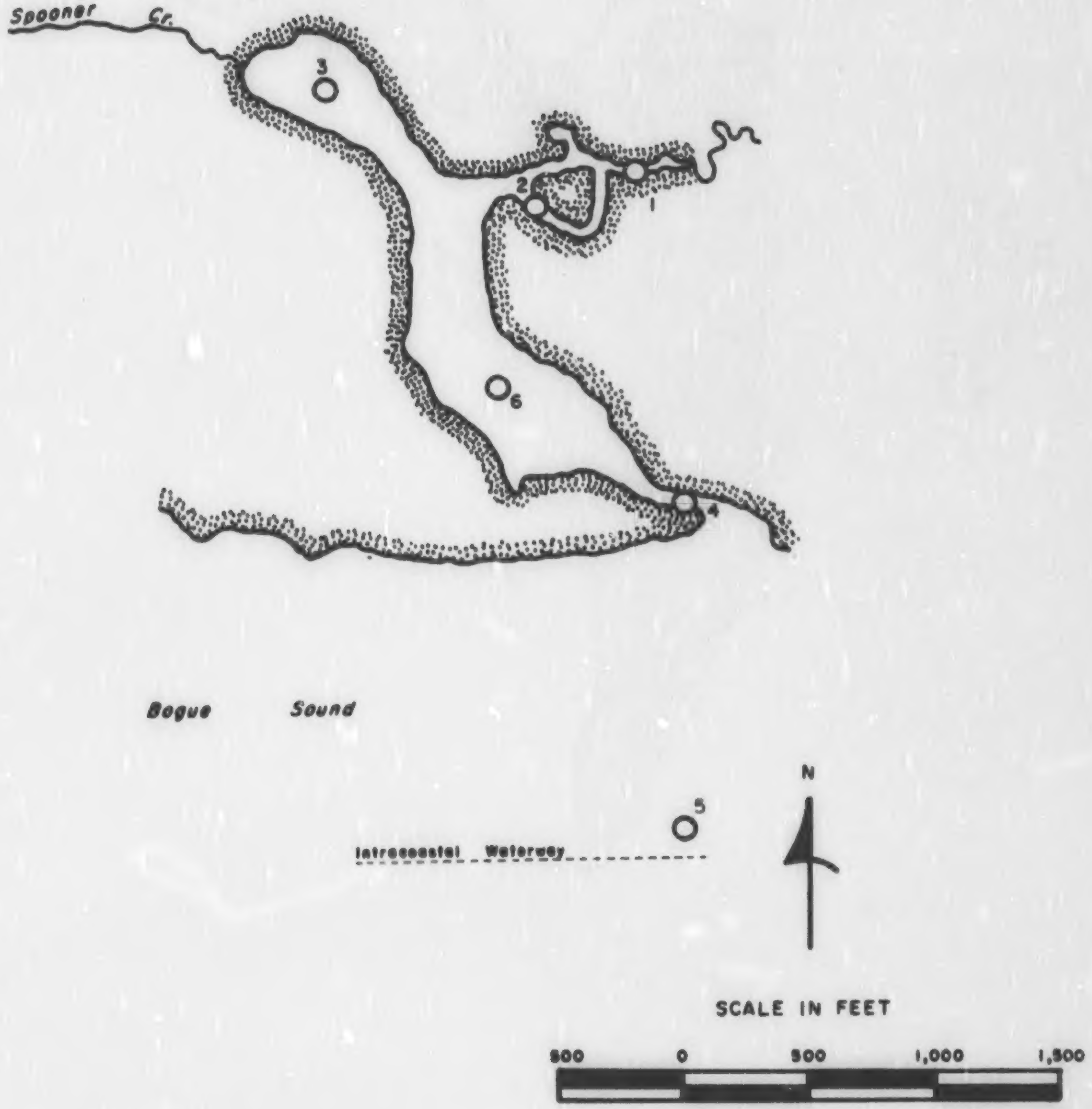

Spooner Cr.
3
2
1
6
4
Bogue Sound
5
Intracoastal Waterway
N
SCALE IN FEET
500
0
500
1,000
1,500

FIGURE 35
STUDY SITES
NORTH CAROLINA
SEPTEMBER, 1974

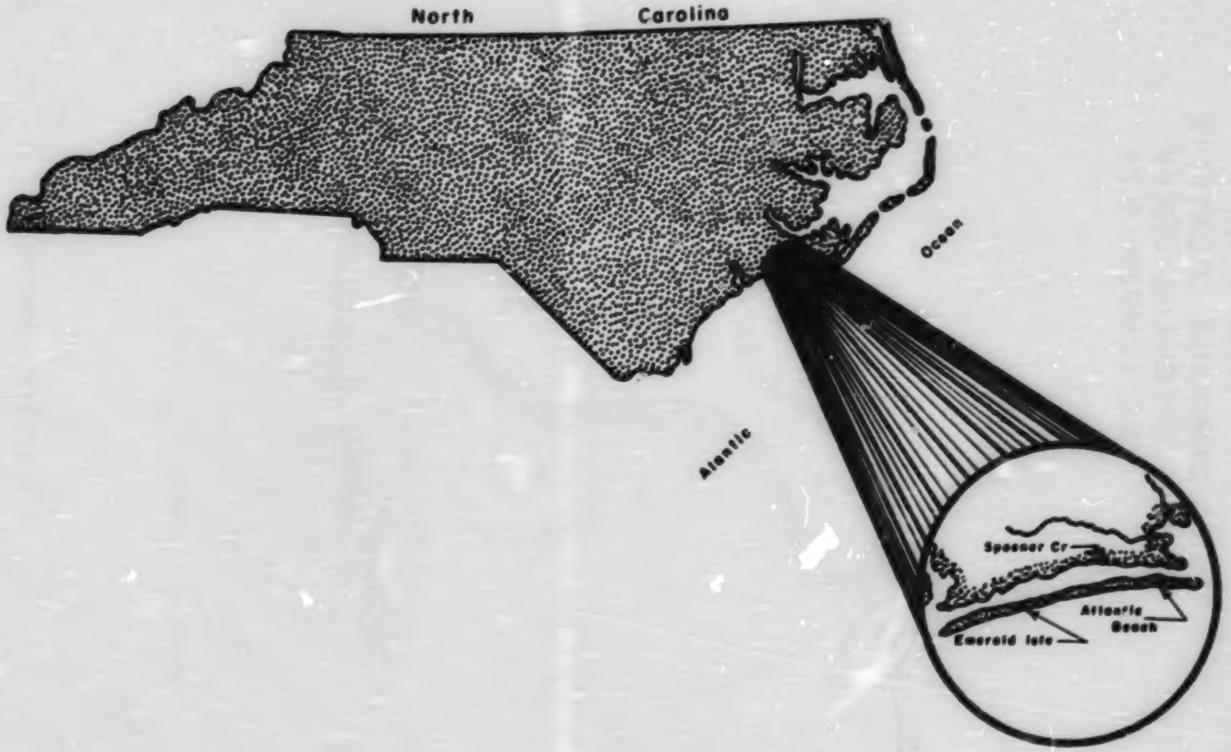
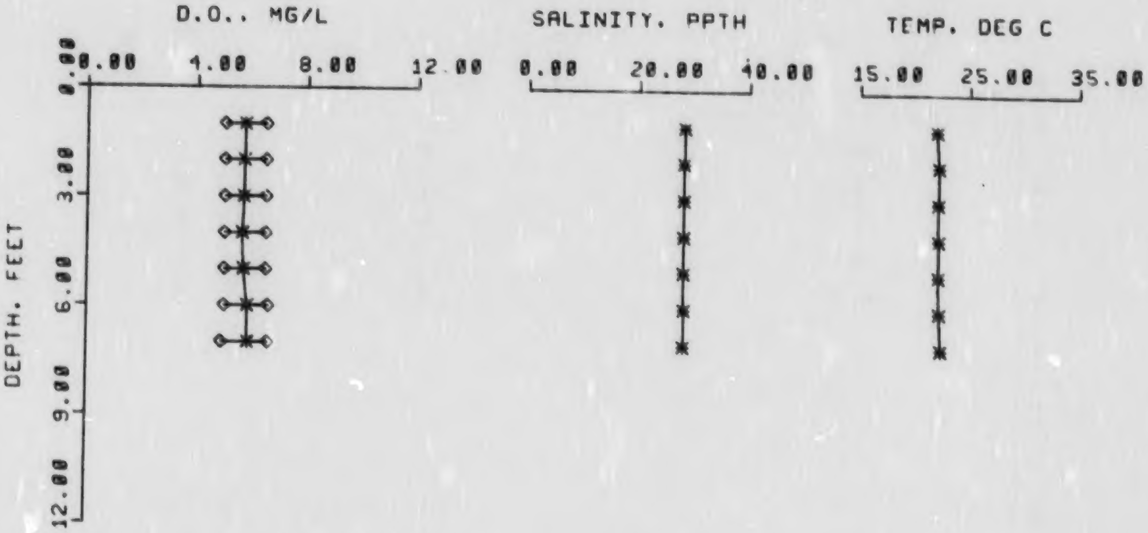
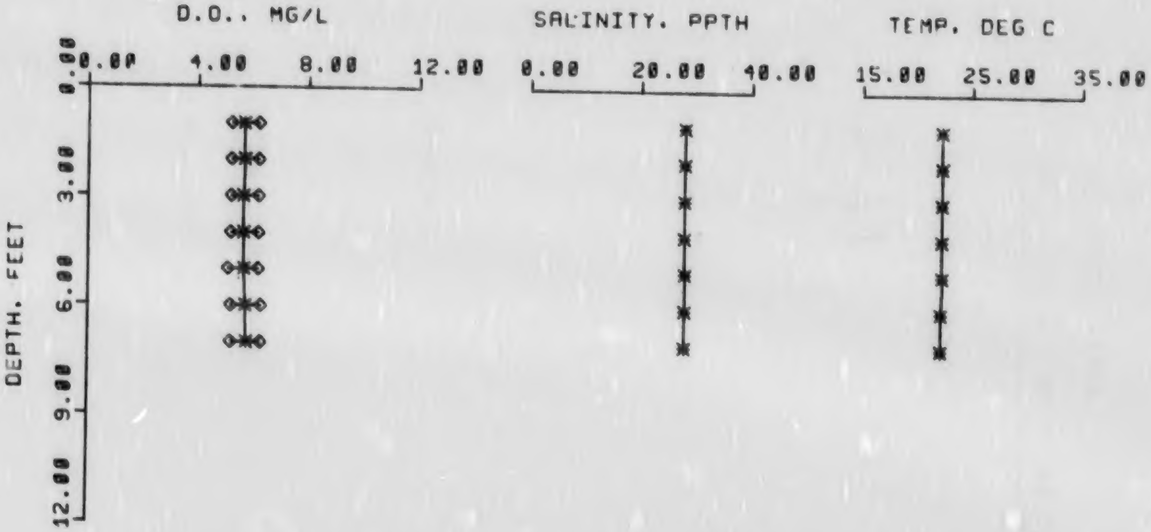

North
Carolina
Ocean
Atlantic
Spooner Cr
Atlantic Beach
Emerald Isle

FIGURE 36
PROFILES
PUNTA GORDA

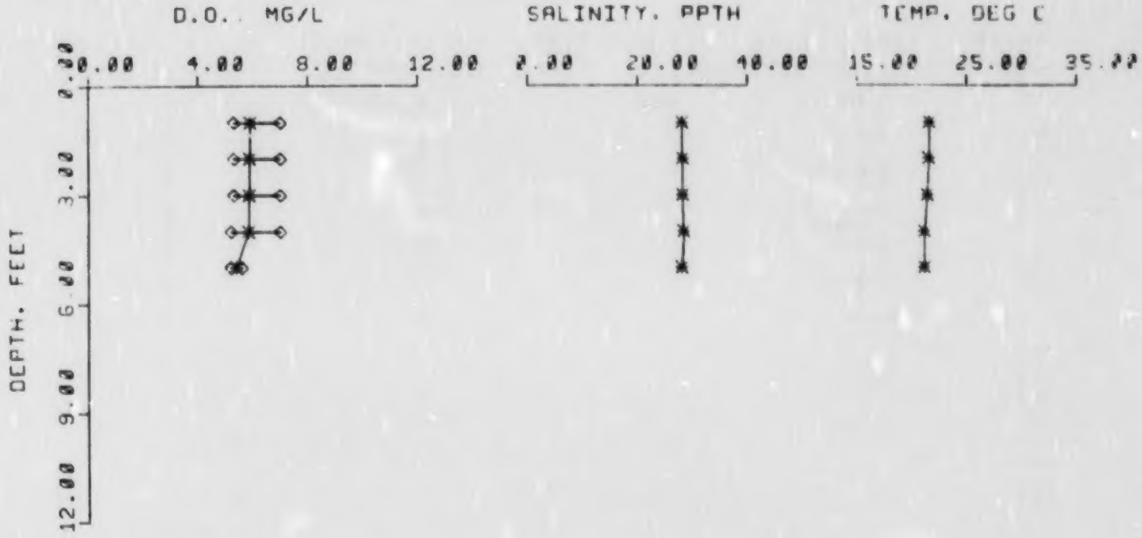


PG-01 NOV 73

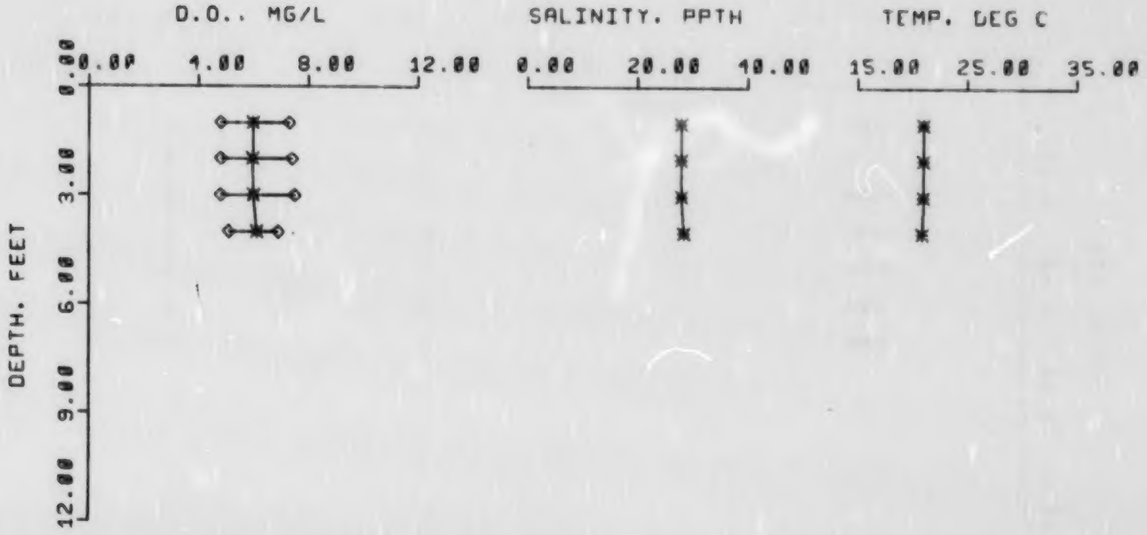


PG-02 NOV 73

FIGURE 37
PROFILES
PUNTA GORDA

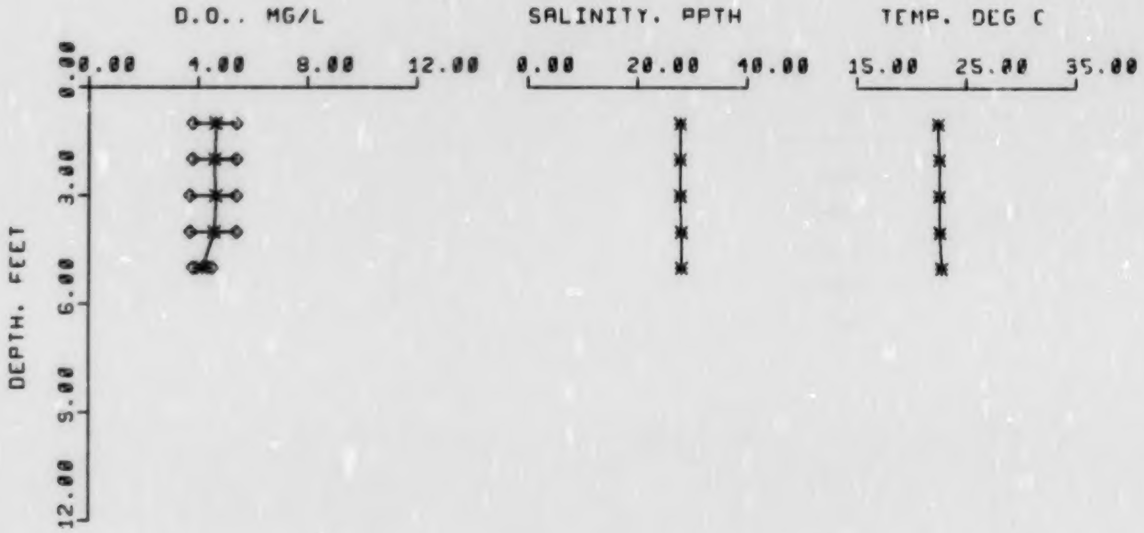


PG-03 NOV 73

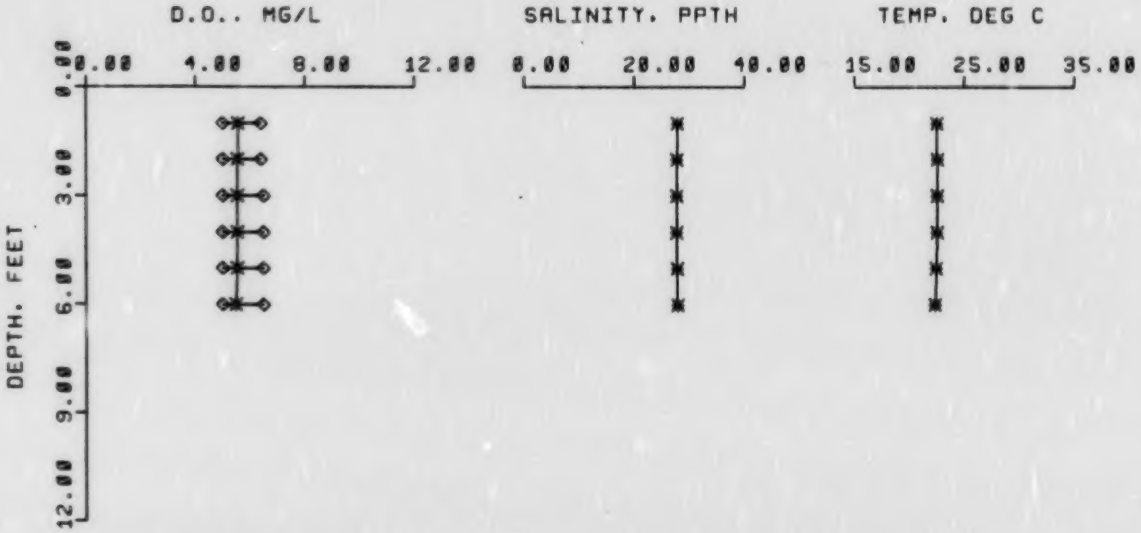


PG-04 NOV 73

FIGURE 38
PROFILES
PUNTA GORDA

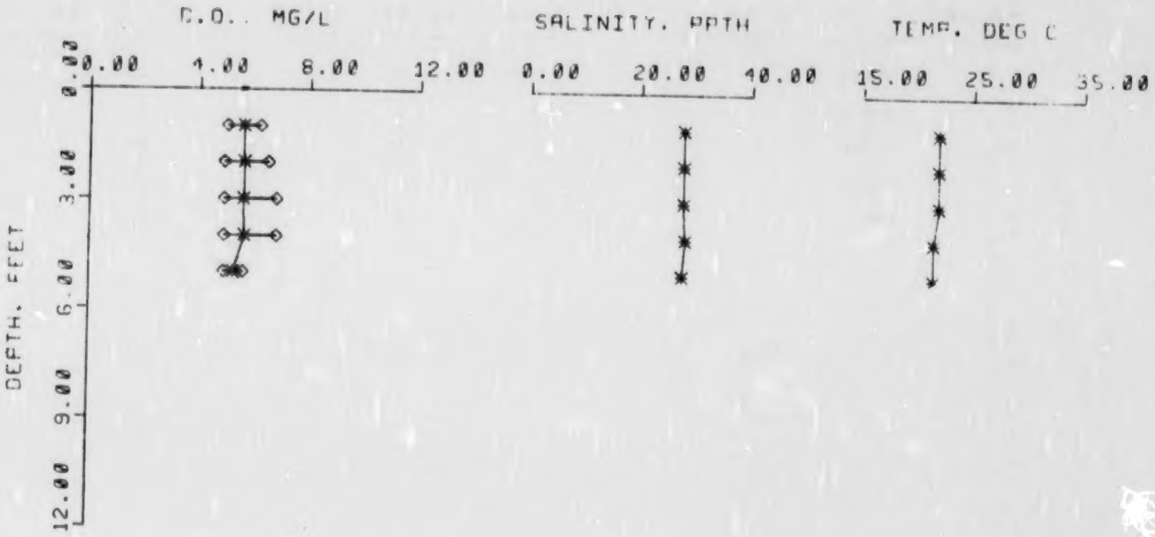


PG-05 NOV 73



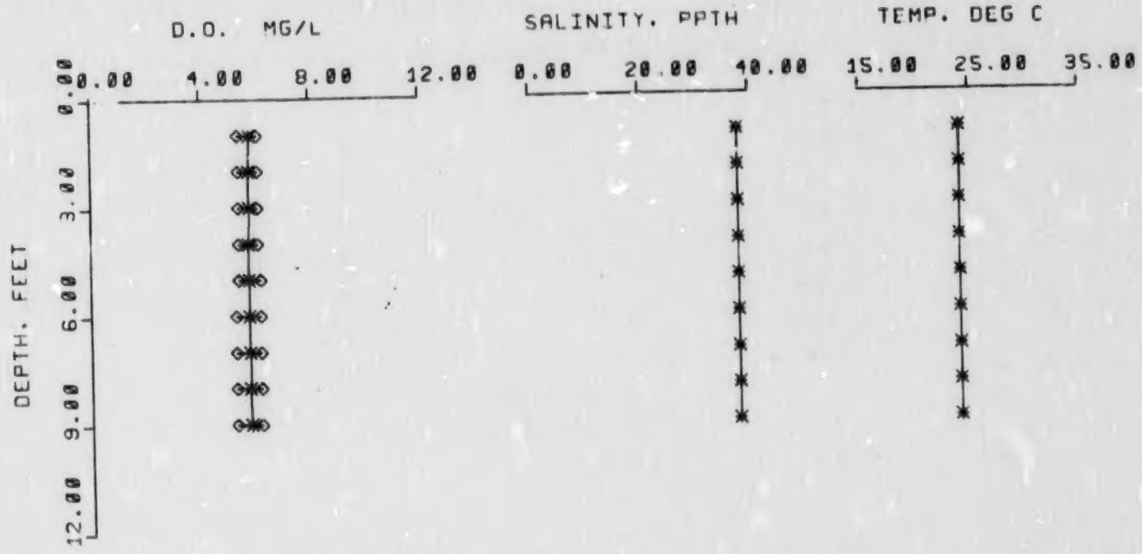
PG-06 NOV 73

FIGURE 39
PROFILES
PUNTA GORDA

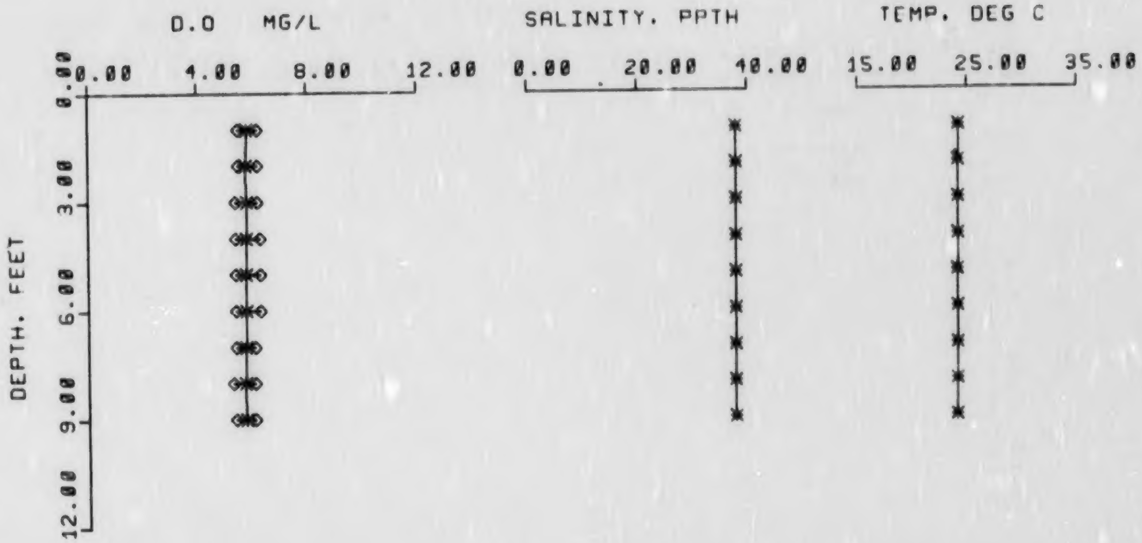


PG-07 NOV 73

FIGURE 40
PROFILES
BIG PINE KEY

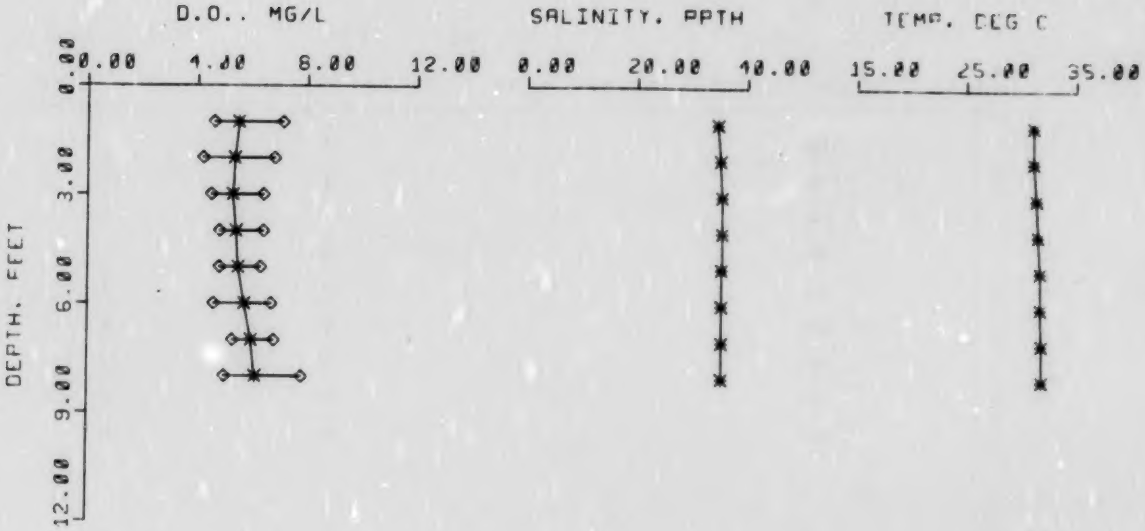


BPK-08 NOV 73

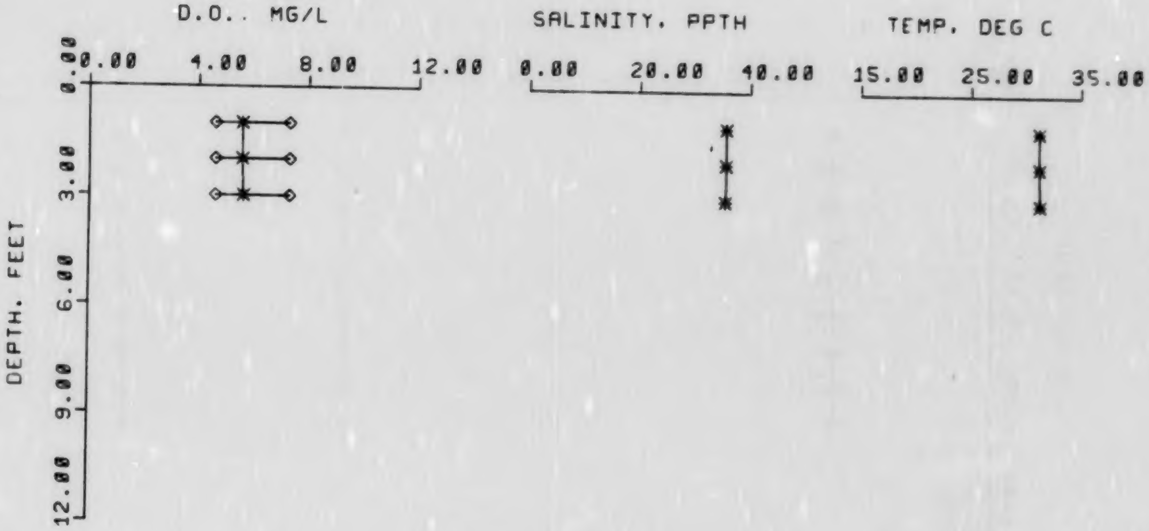


BPK-09 NOV 73

FIGURE 41
PROFILES
BIG PINE KEY

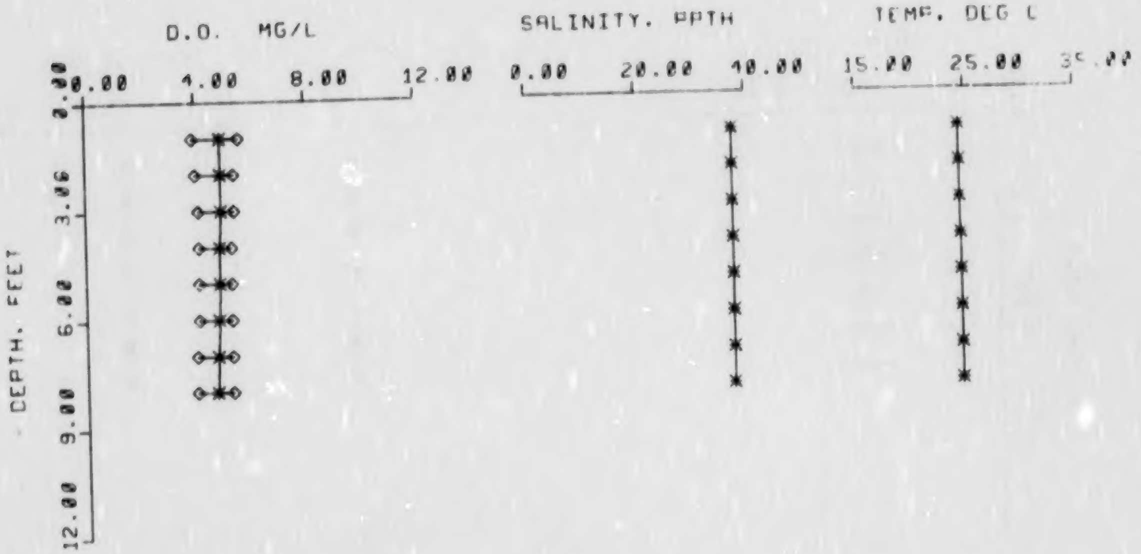


BPK-10 AUG 74

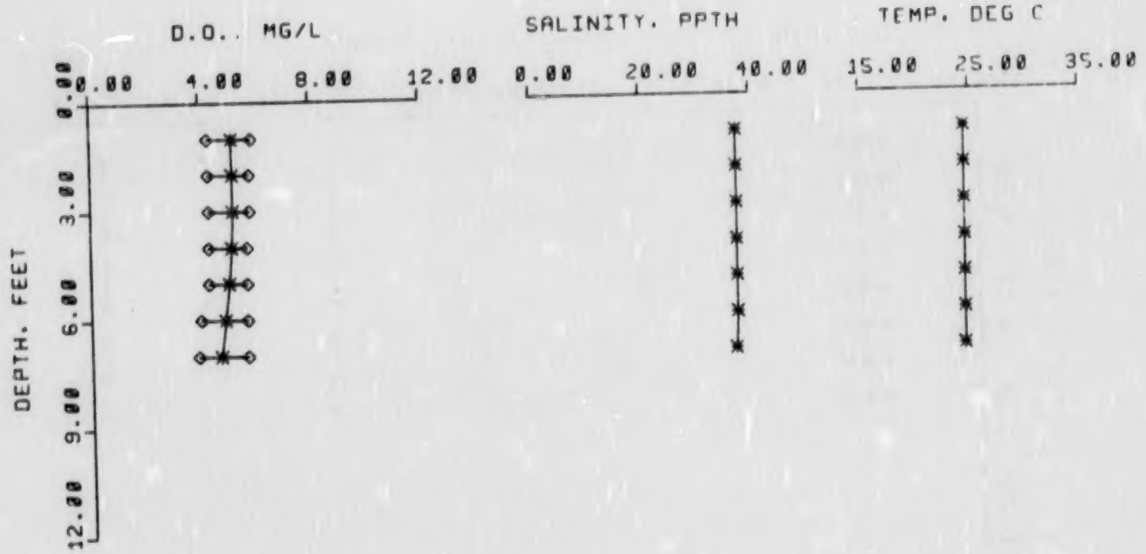


BPK-11 AUG 74

FIGURE 42
PROFILES
BIG PINE KEY

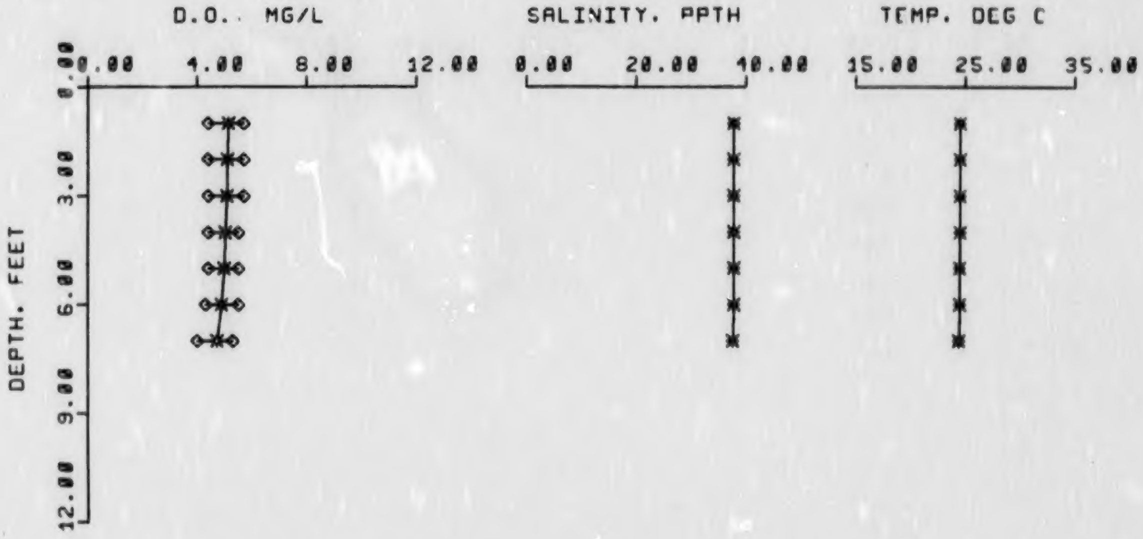


BPK-12 NOV 73

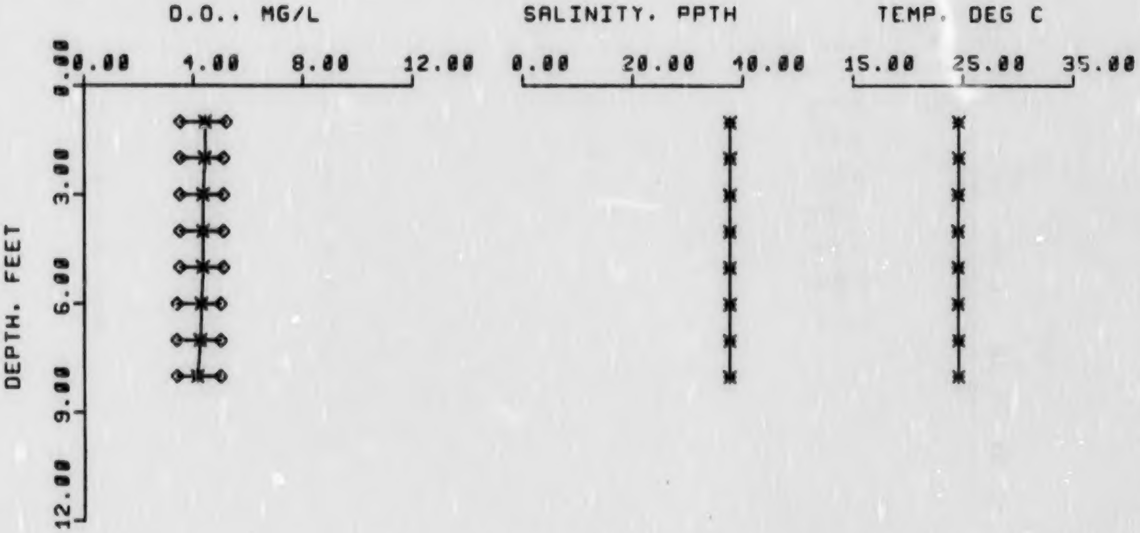


BPK-13 NOV 73

FIGURE 43
PROFILES
BIG PINE KEY

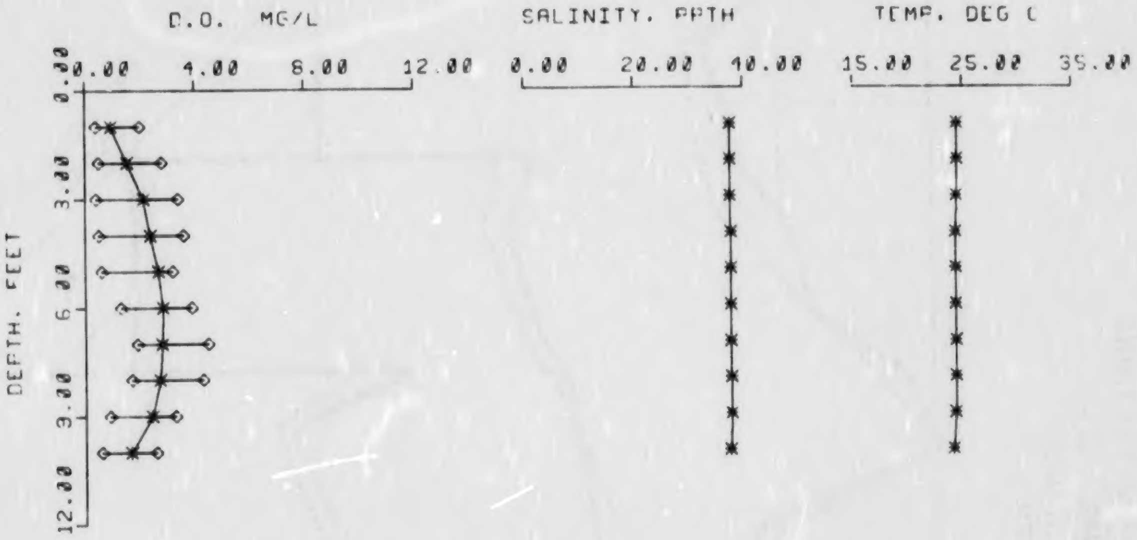


BPK-14 NOV 73



BPK-F NOV 73

FIGURE 44
PROFILES
BIG PINE KEY



BPK-G NOV 73

FIGURE 45
DISSOLVED OXYGEN CONCENTRATIONS
UNDEVELOPED CANAL (I)
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

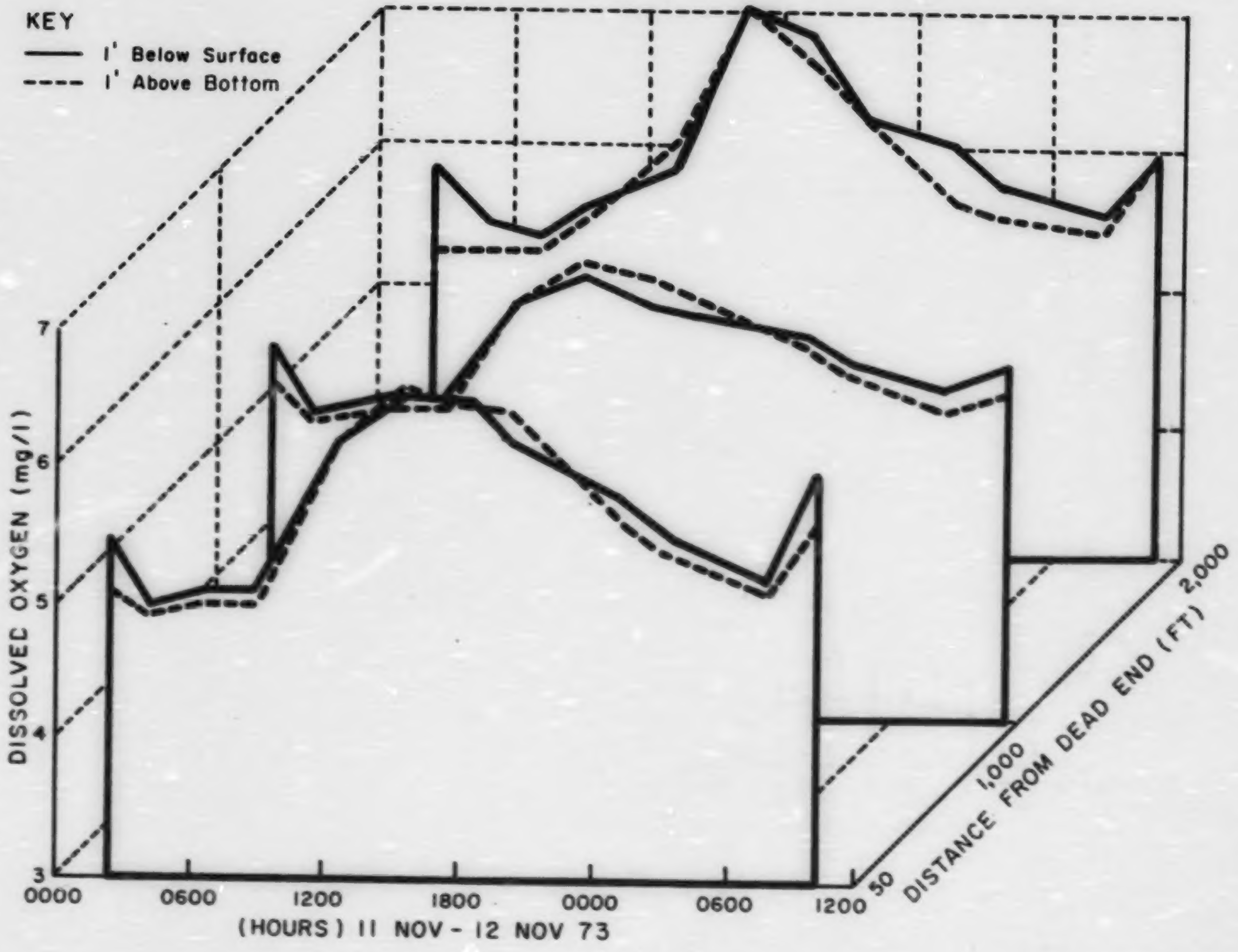


FIGURE 46
DISSOLVED OXYGEN CONCENTRATIONS
DEVELOPED CANAL (II)
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

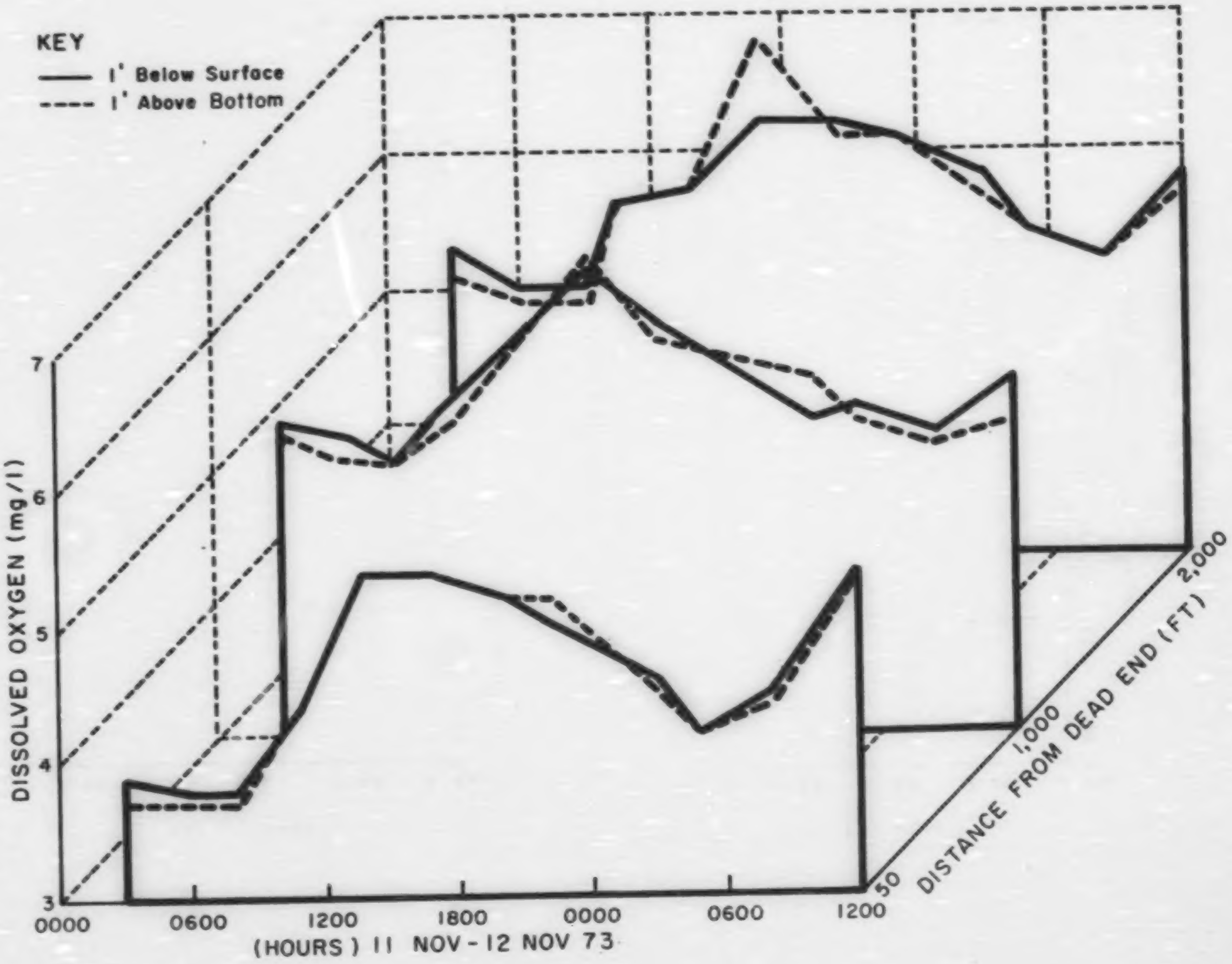
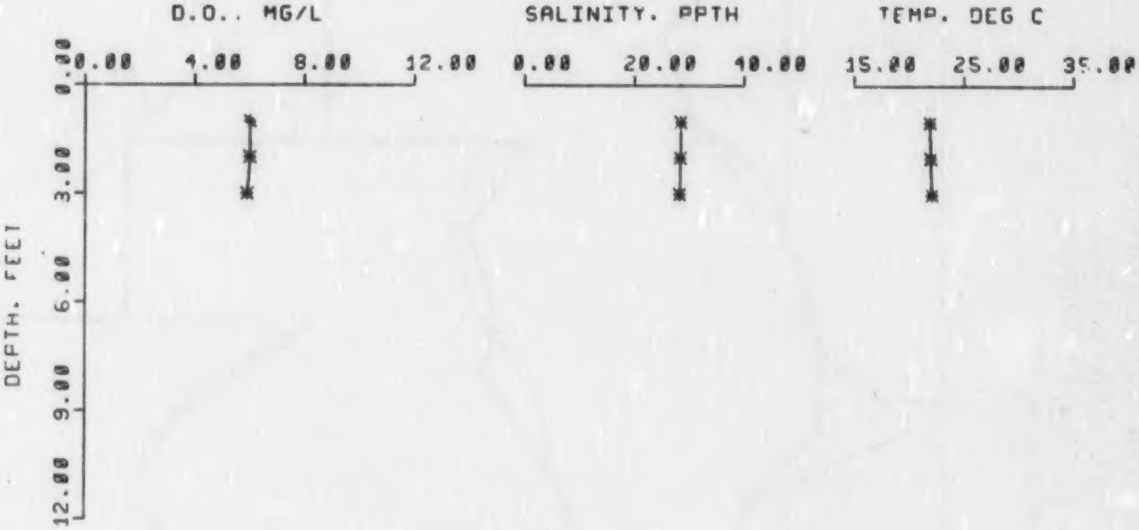
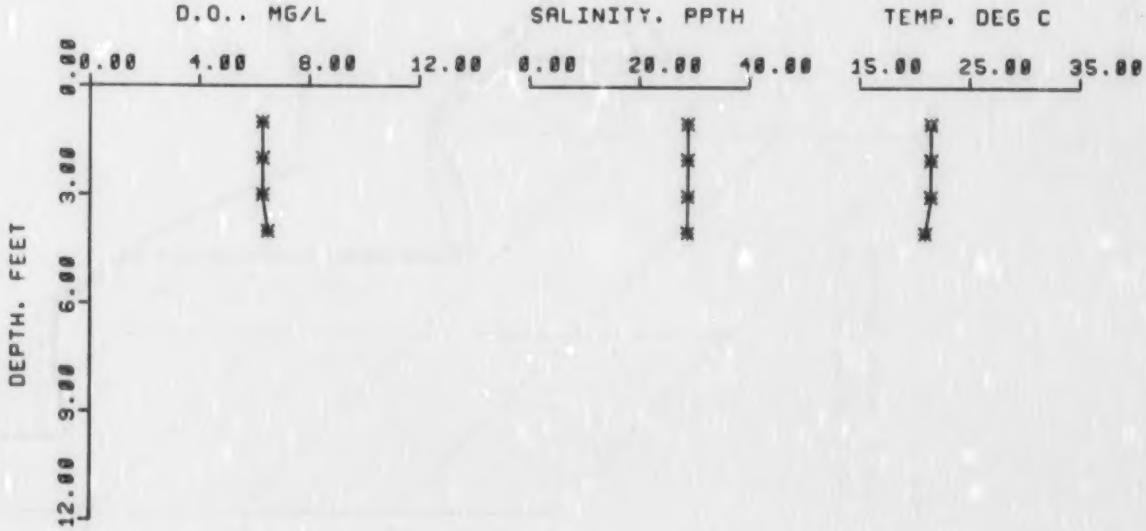


FIGURE 47
PROFILES
PUNTA GORDA

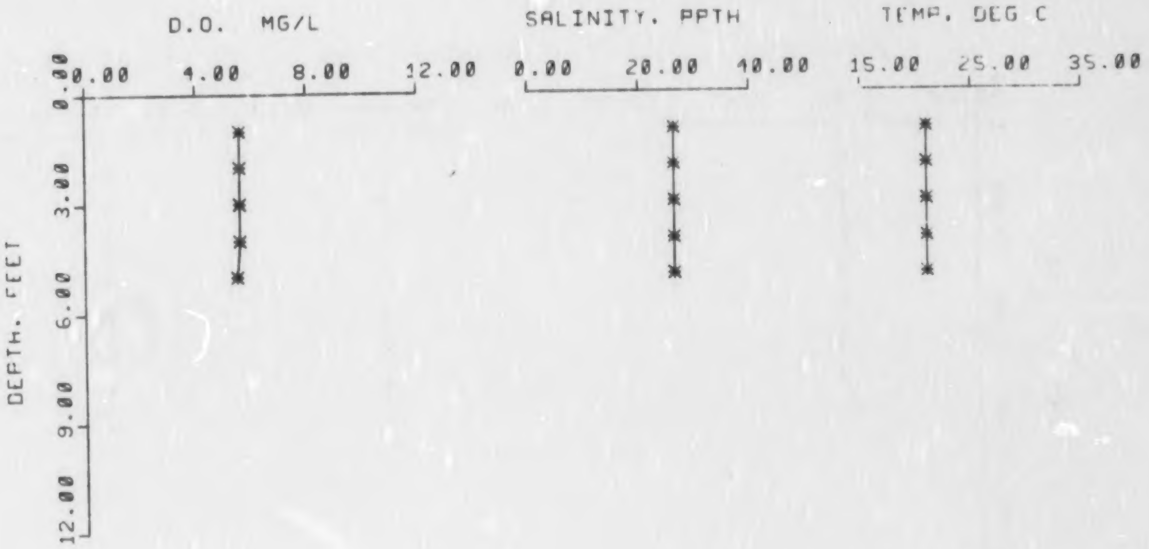


PG-A NOV 73

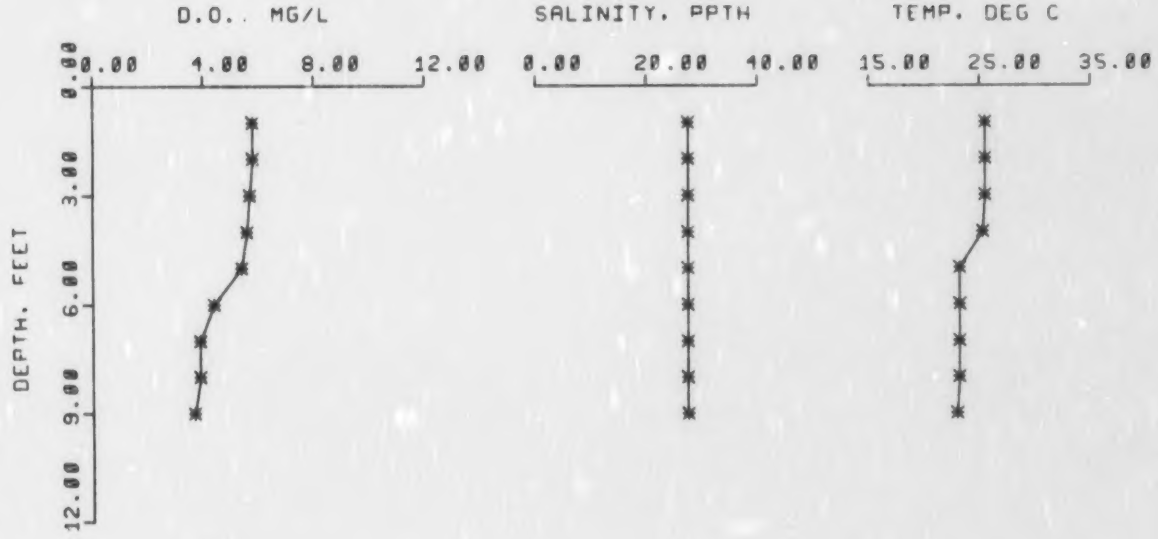


PG-B NOV 73

FIGURE 48
PROFILES
PUNTA GORDA

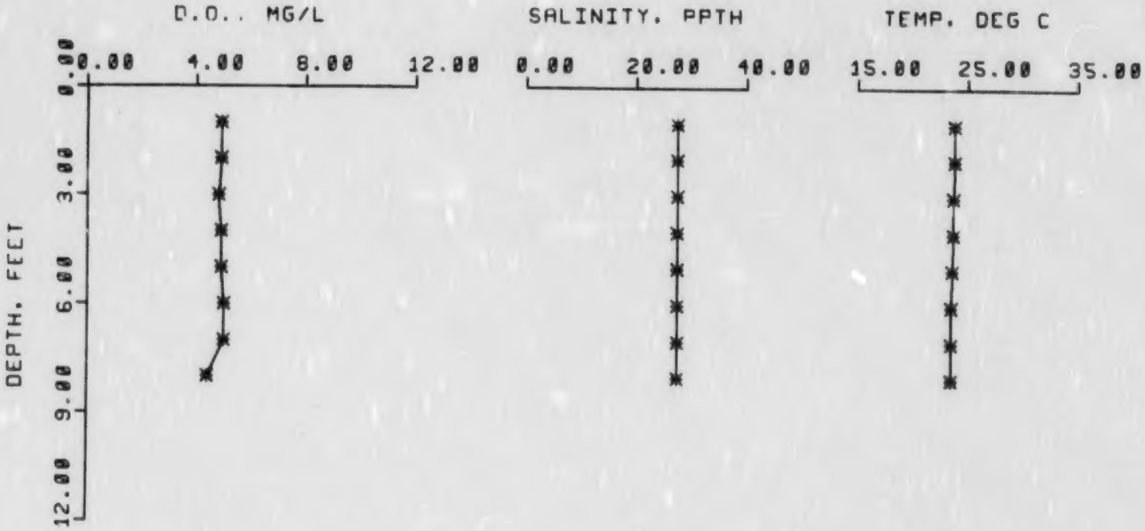


PG-C NOV 73



PG-D NOV 73

FIGURE 49
PROFILES
PUNTA GORDA



PG-E NOV 73

FIGURE 50
DISSOLVED OXYGEN CONCENTRATIONS
UNDEVELOPED CANAL III
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

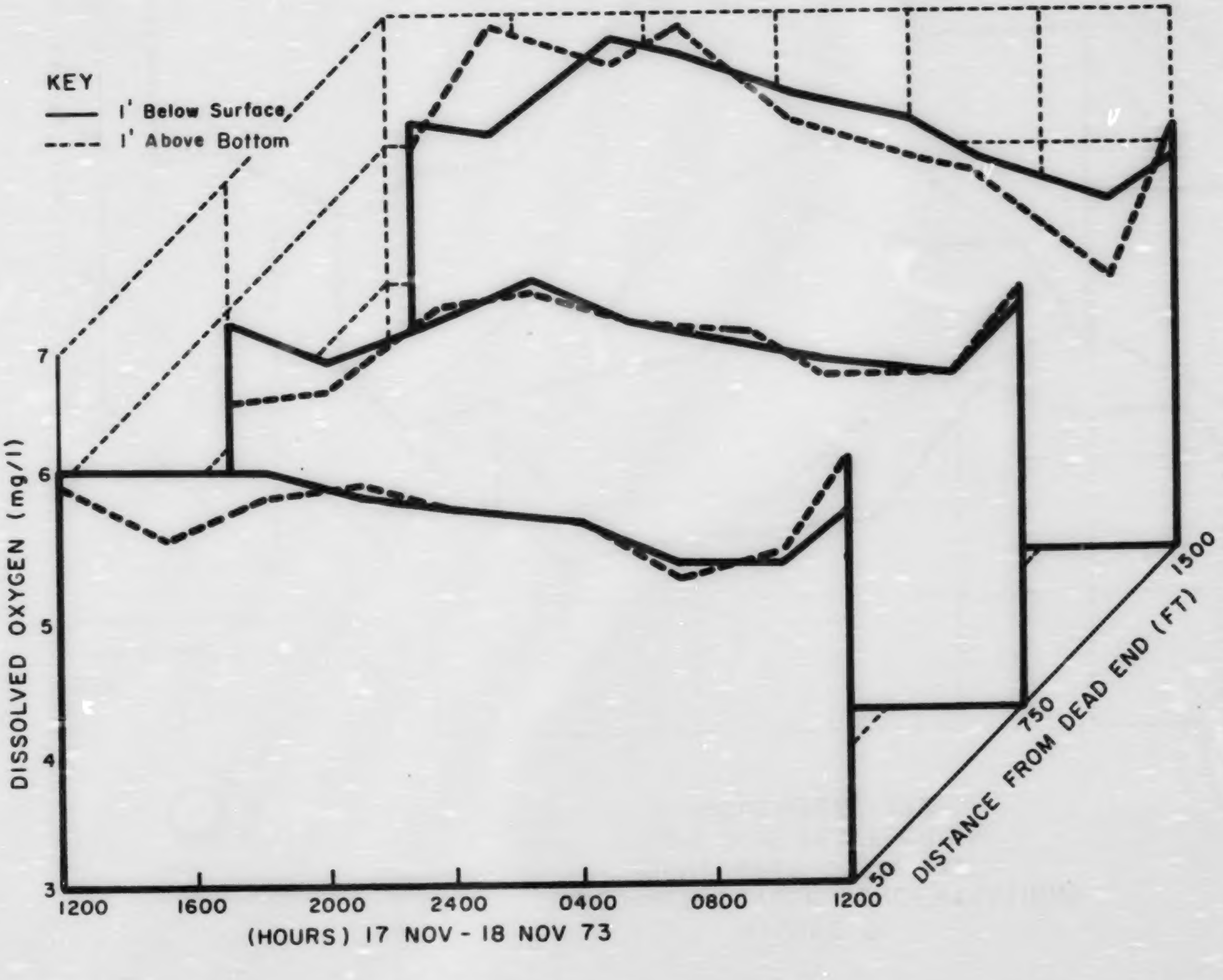


FIGURE 51
DISSOLVED OXYGEN CONCENTRATIONS
DEVELOPED CANAL (IV)
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

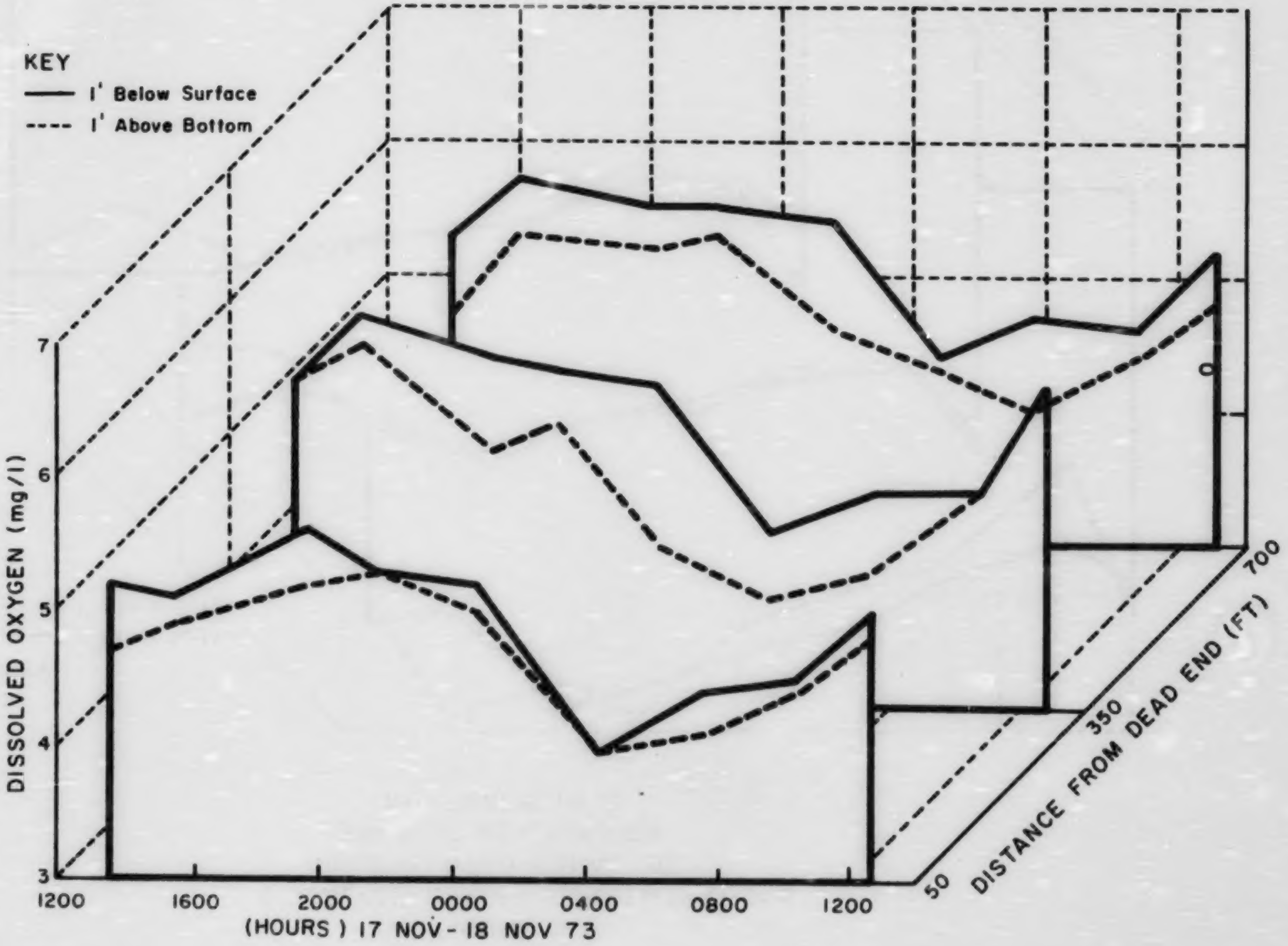
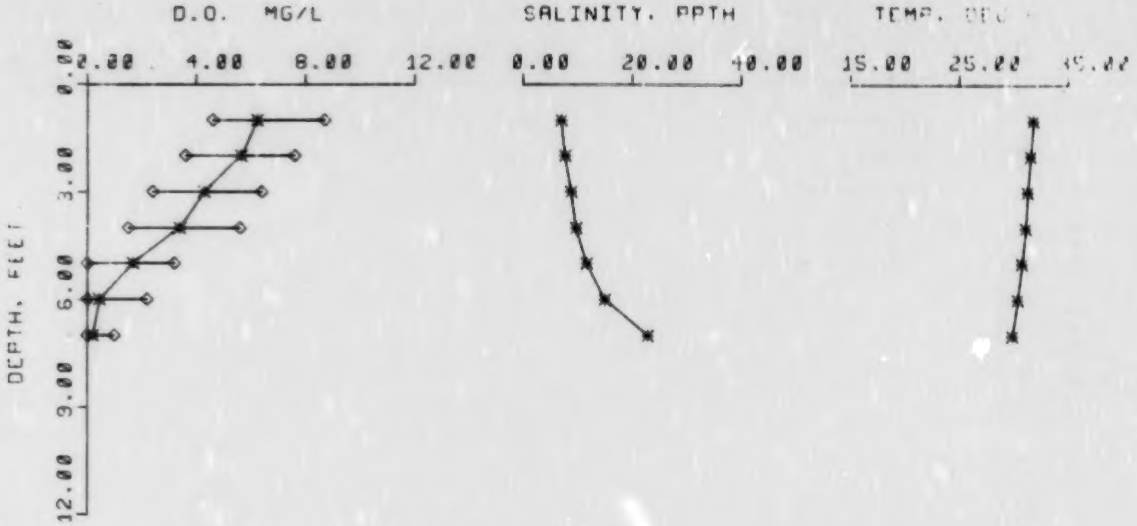
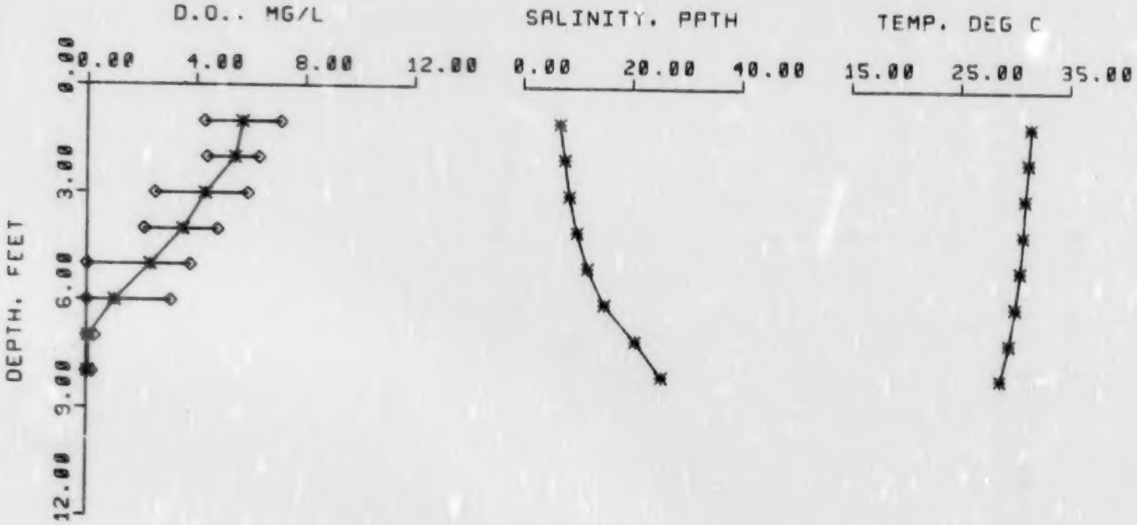


FIGURE 52
PROFILES
PUNTA GORDA

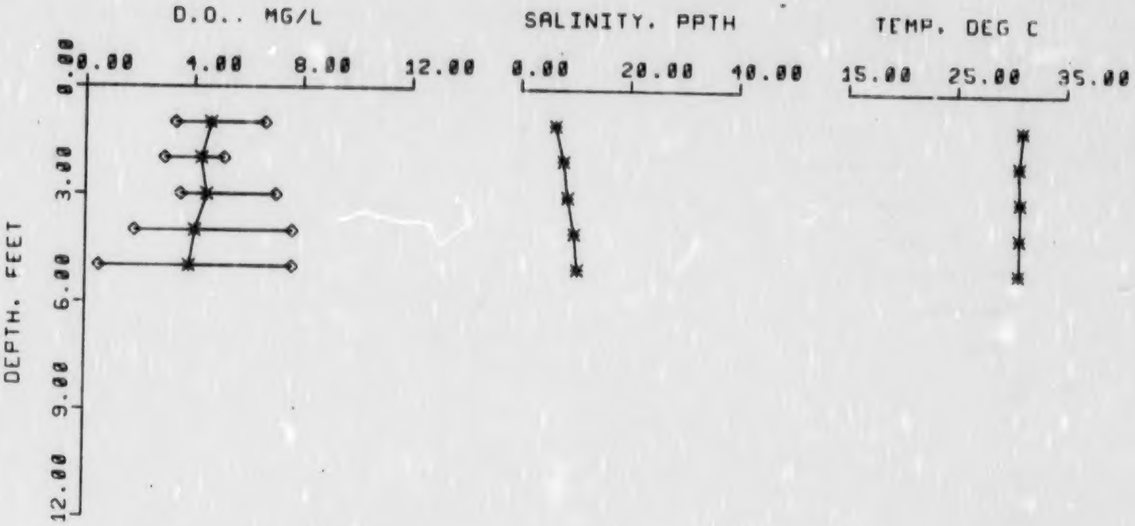


PG-01 AUG 74

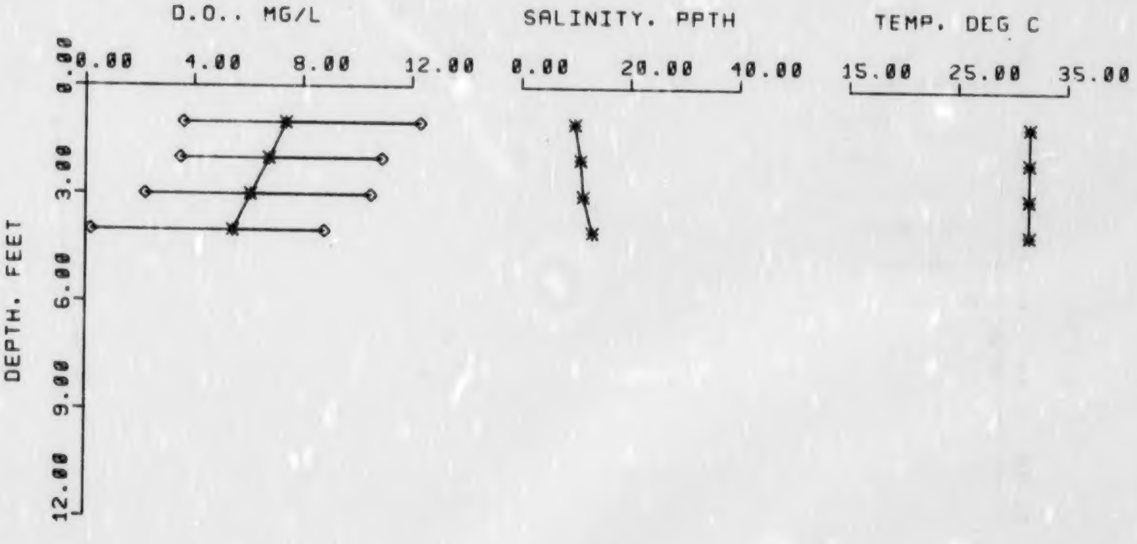


PG-02 AUG 74

FIGURE 53
PROFILES
PUNTA GORDA

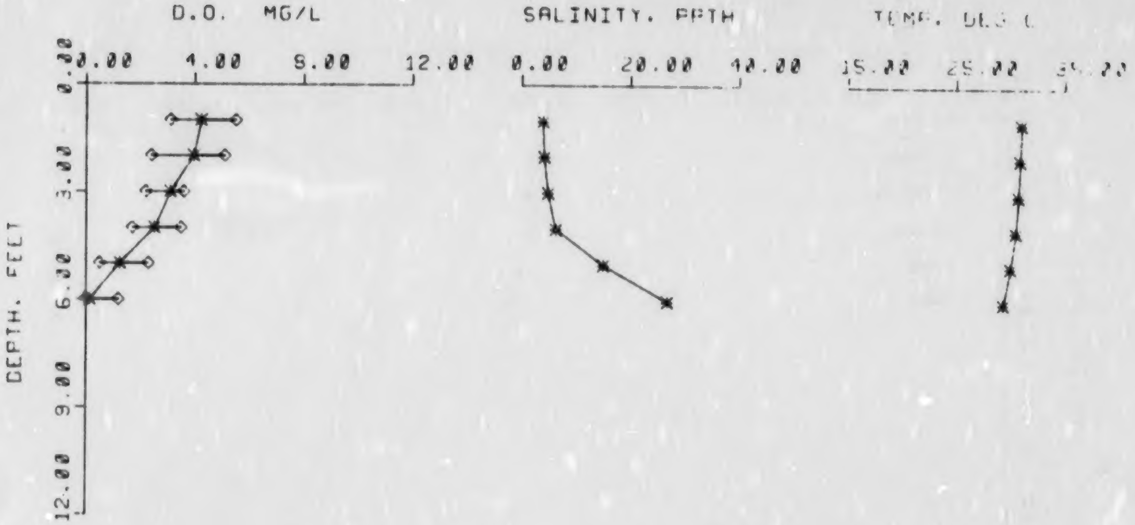


PG-03 AUG 74

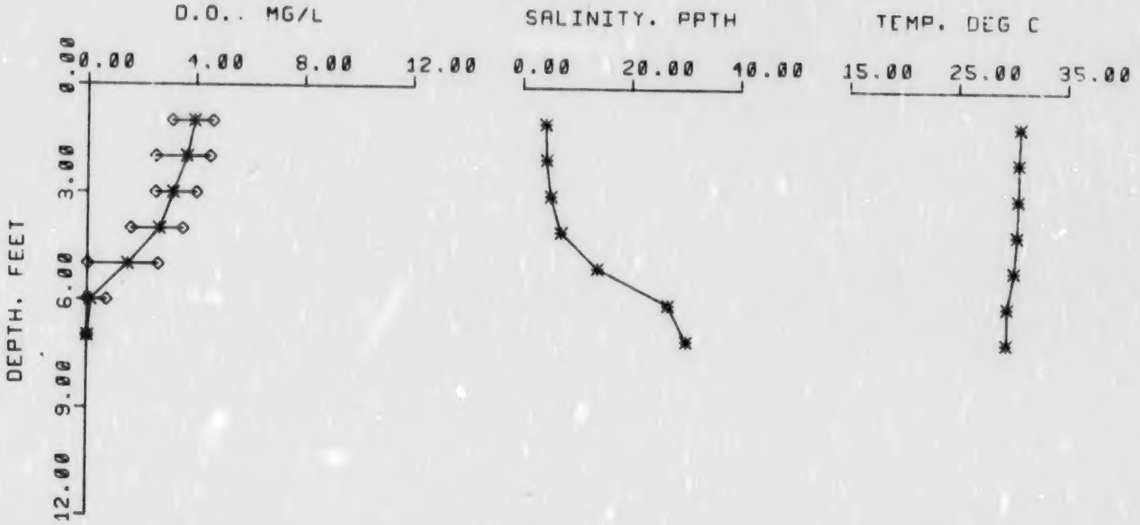


PG-04 AUG 74

FIGURE 54
PROFILES
PUNTA GORDA

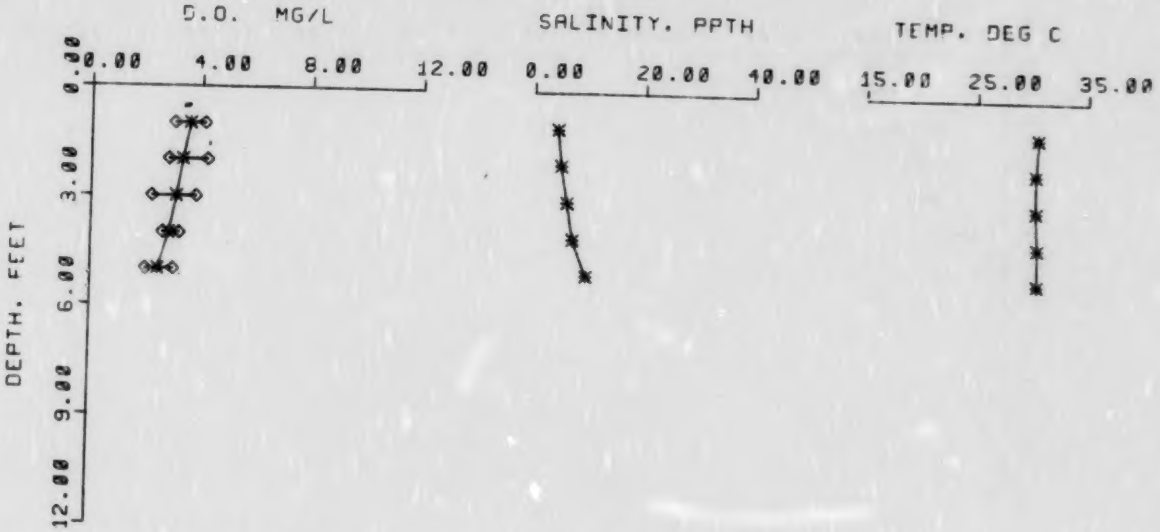


PG-05 AUG 74



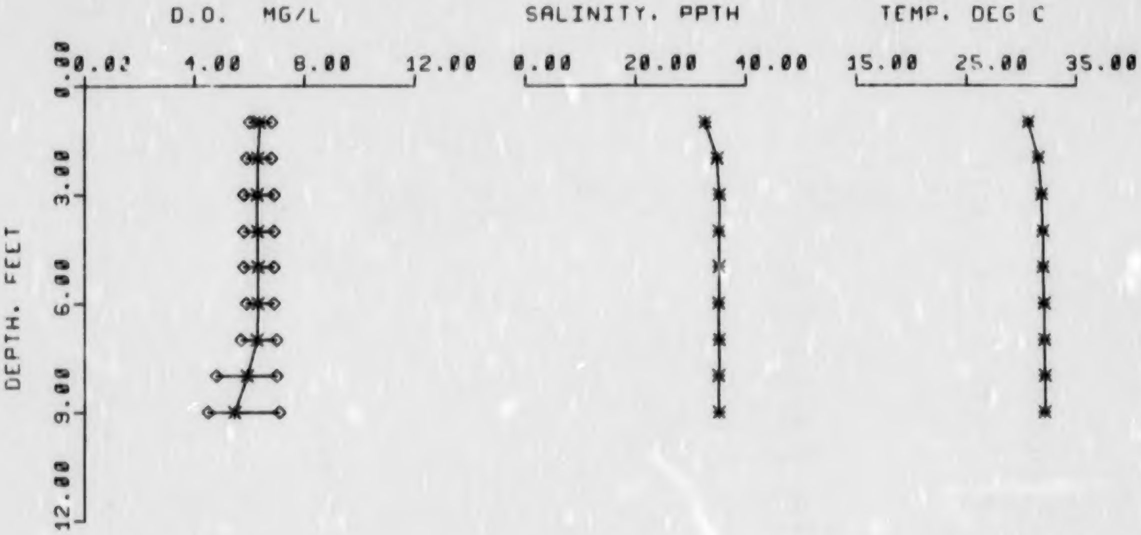
PG-06 AUG 74

FIGURE 55
PROFILES
PUNTA GORDA

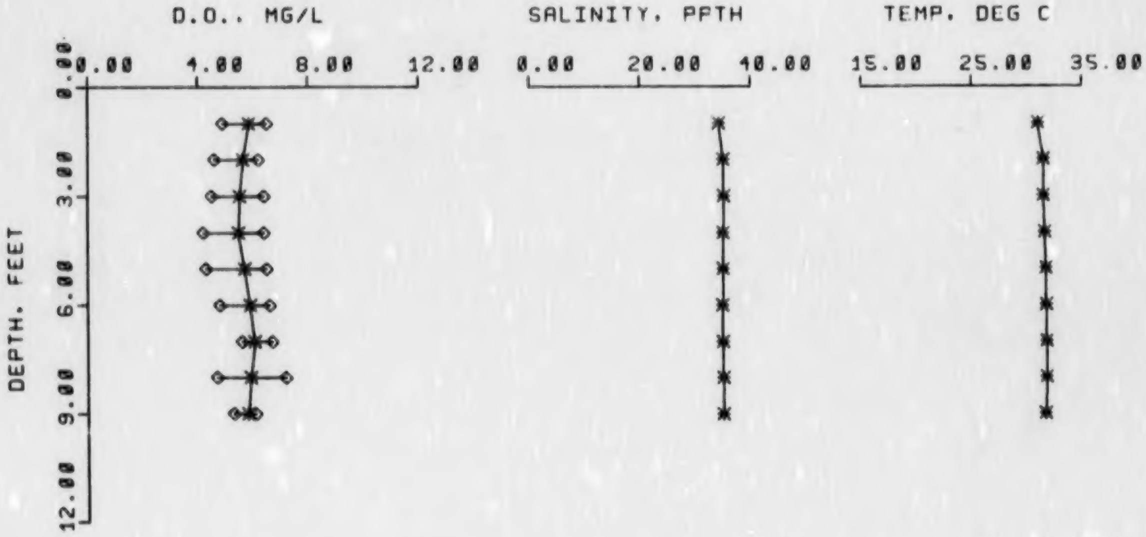


PG-07 AUG 74

FIGURE 56
PROFILES
BIG PINE KEY

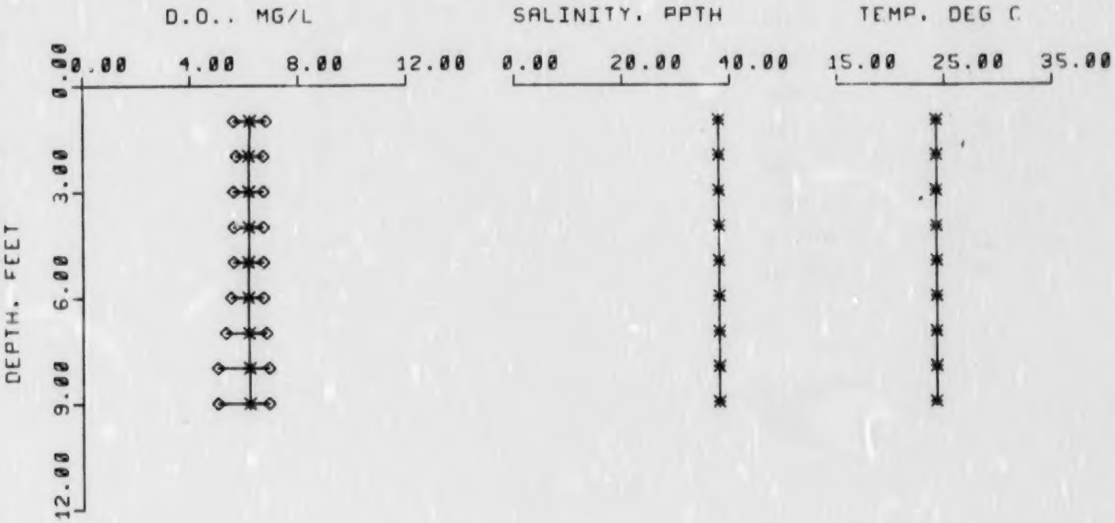


BPK-08 AUG 74

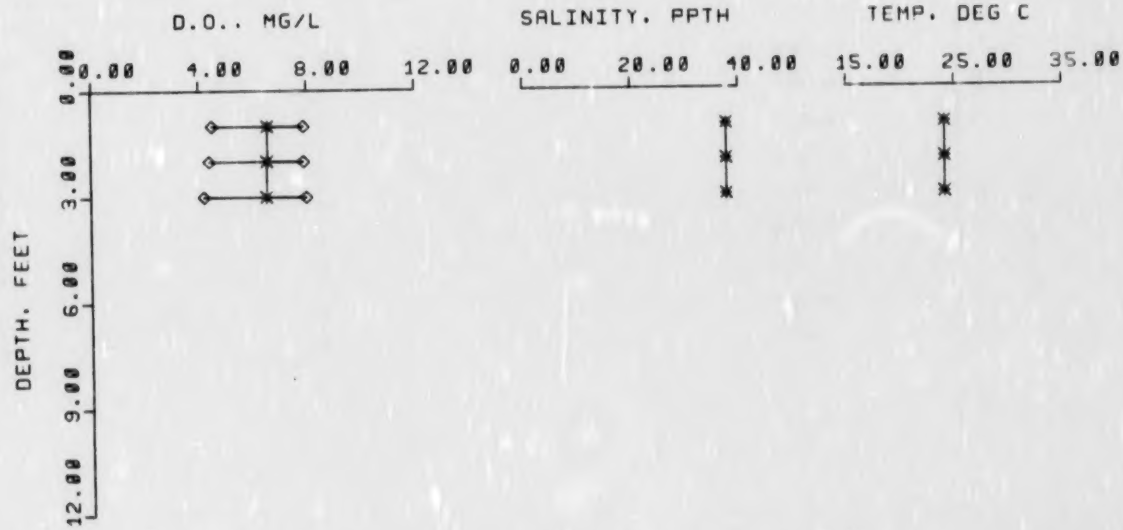


BPK-09 AUG 74

FIGURE 57
PROFILES
BIG PINE KEY

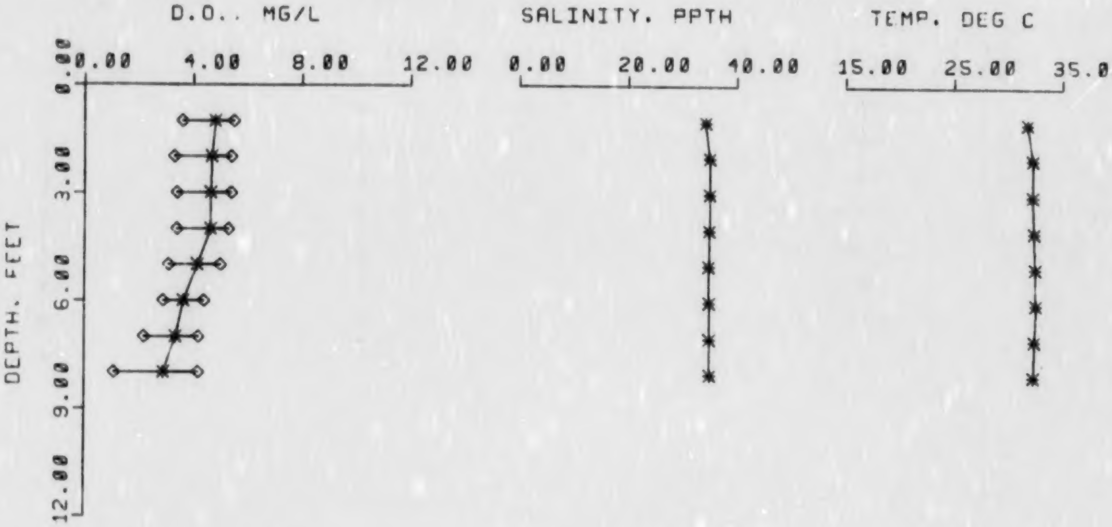


BPK-10 NOV 73

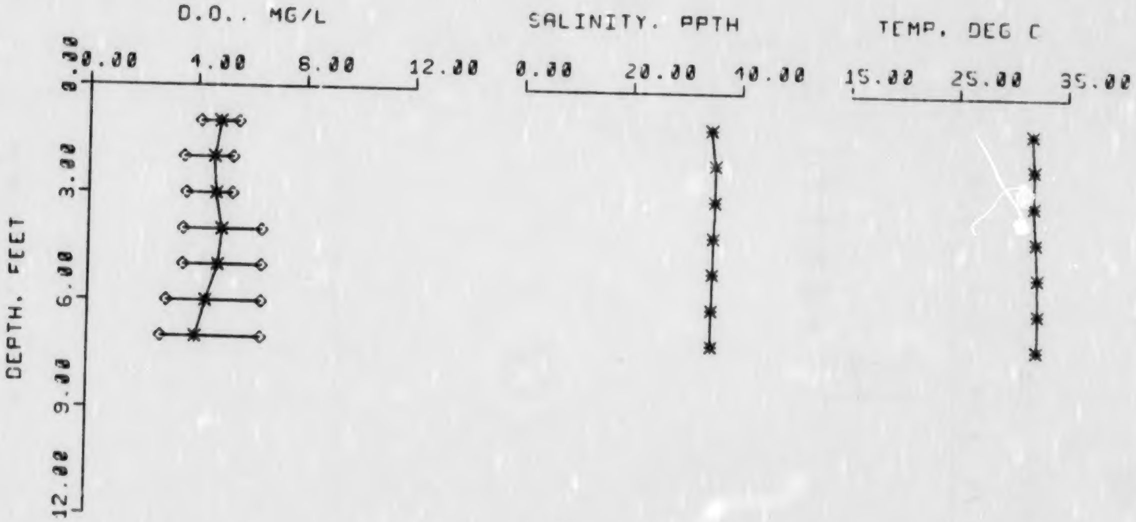


BPK-11 NOV 73

FIGURE 58
PROFILES
BIG PINE KEY

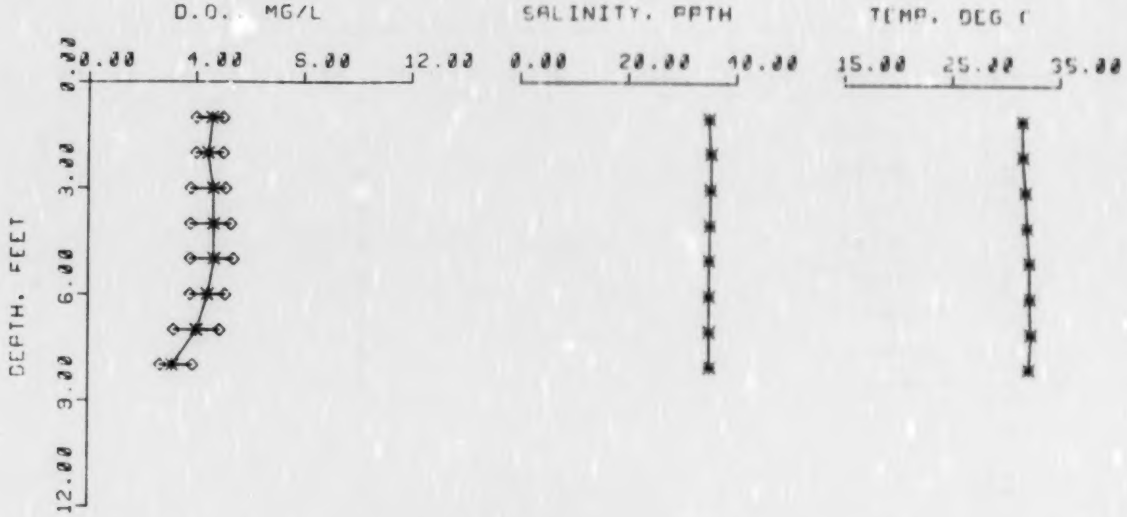


BPK-12 AUG 74

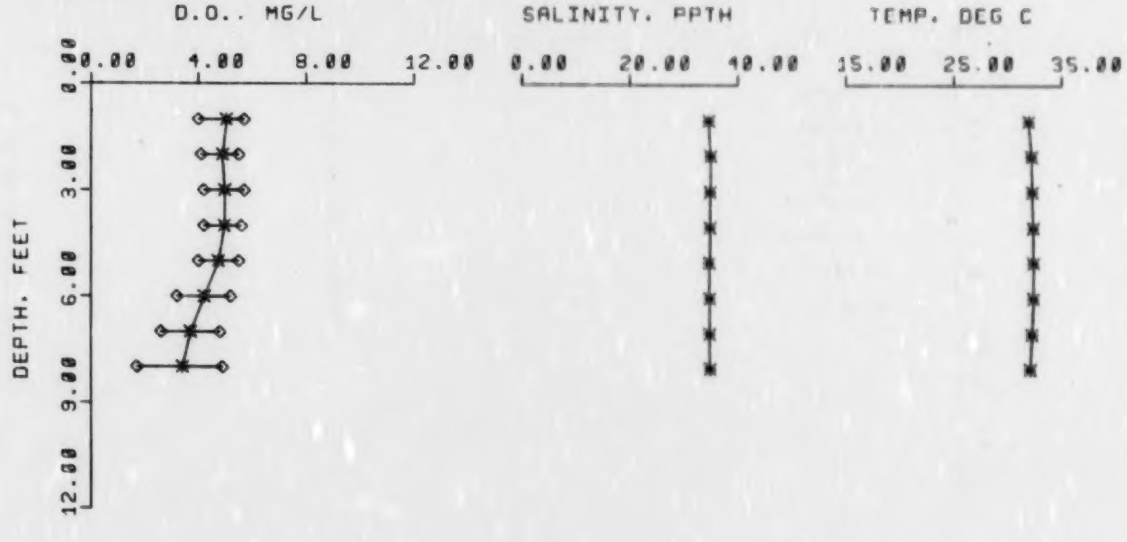


BPK-13 AUG 74

FIGURE 59
PROFILES
BIG PINE KEY

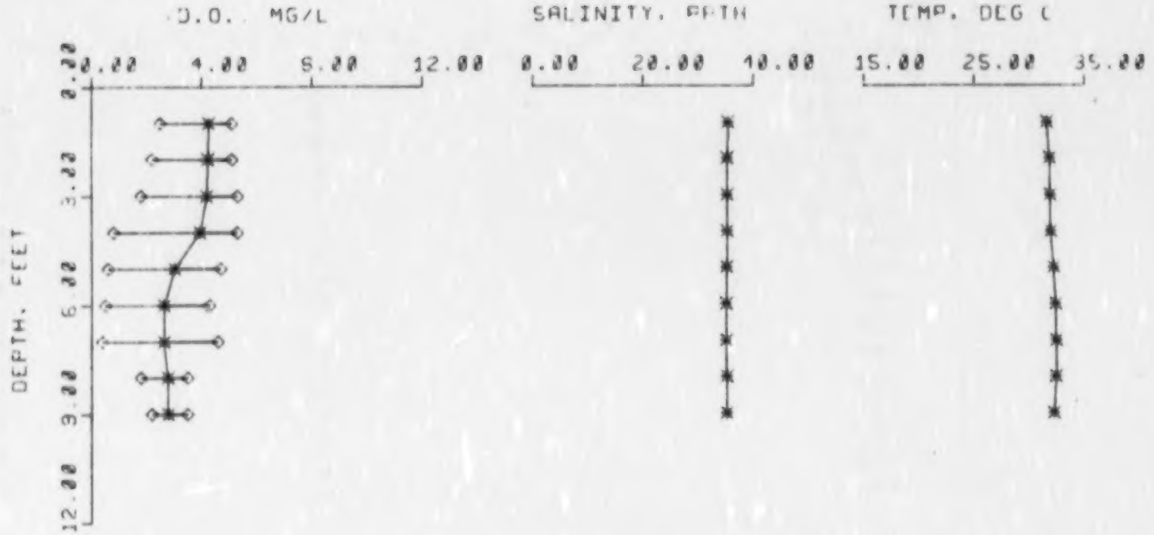


BPK-14 AUG 74



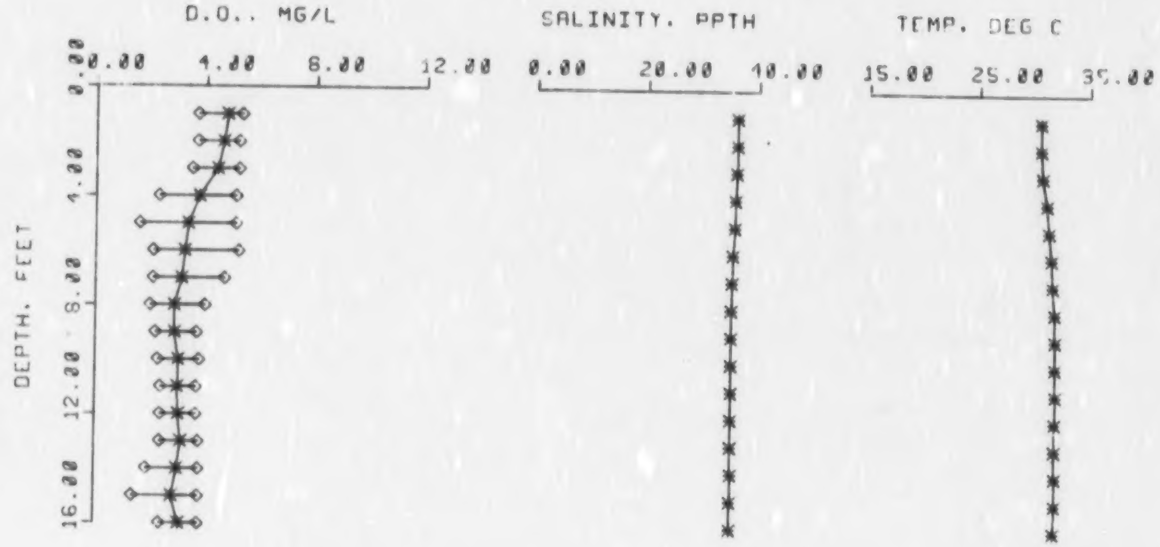
BPK-F AUG 74

FIGURE 60
PROFILES
BIG PINE KEY

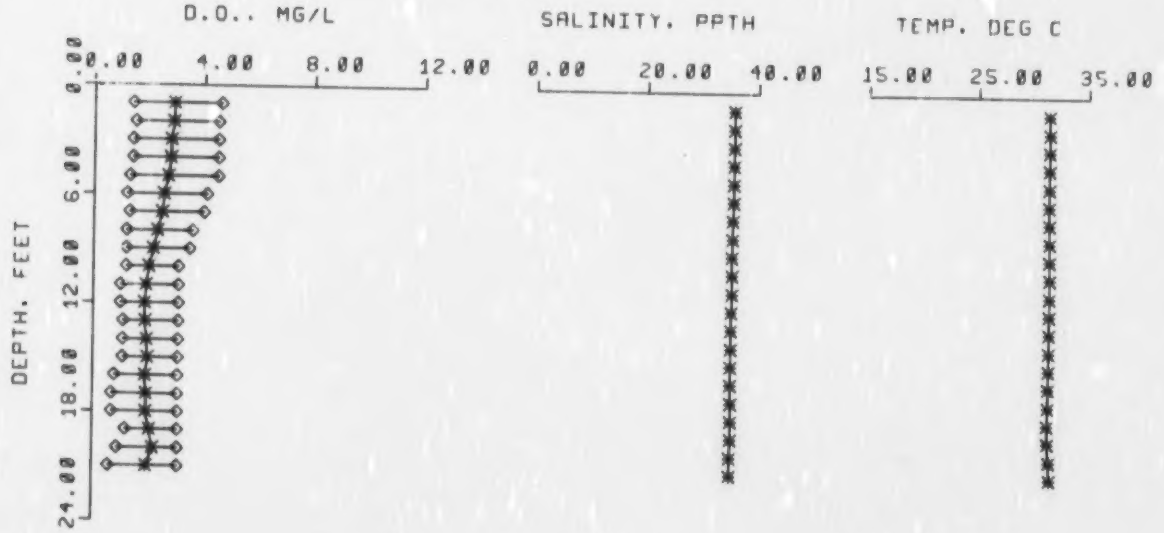


BPK-G AUG 74

FIGURE 61
PROFILES
SEA AIR ESTATES

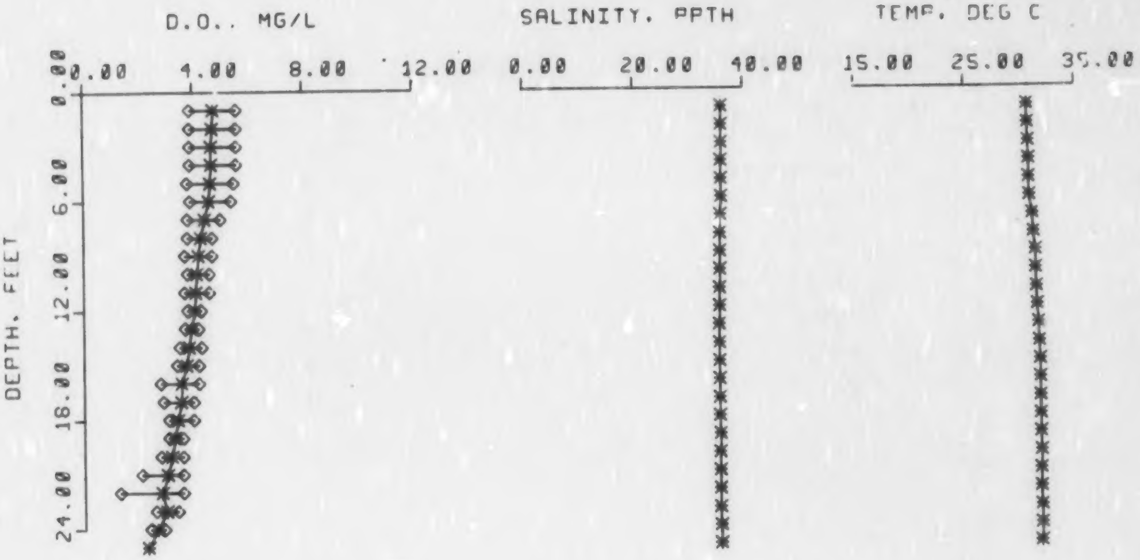


SA-15 AUG 74

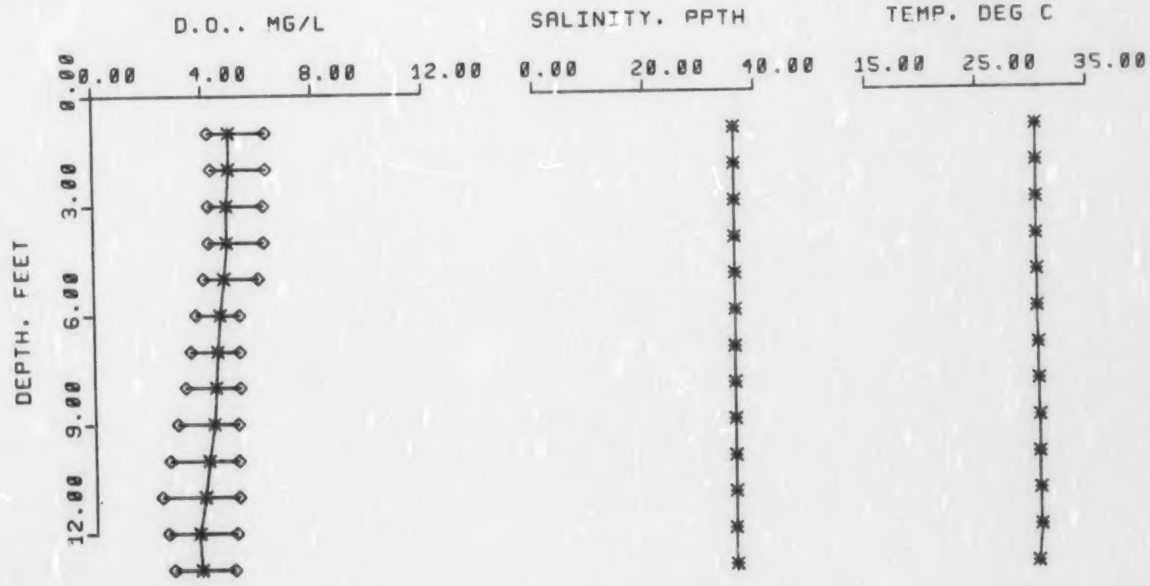


SA-16 AUG 74

FIGURE 62
PROFILES
SEA AIR ESTATES

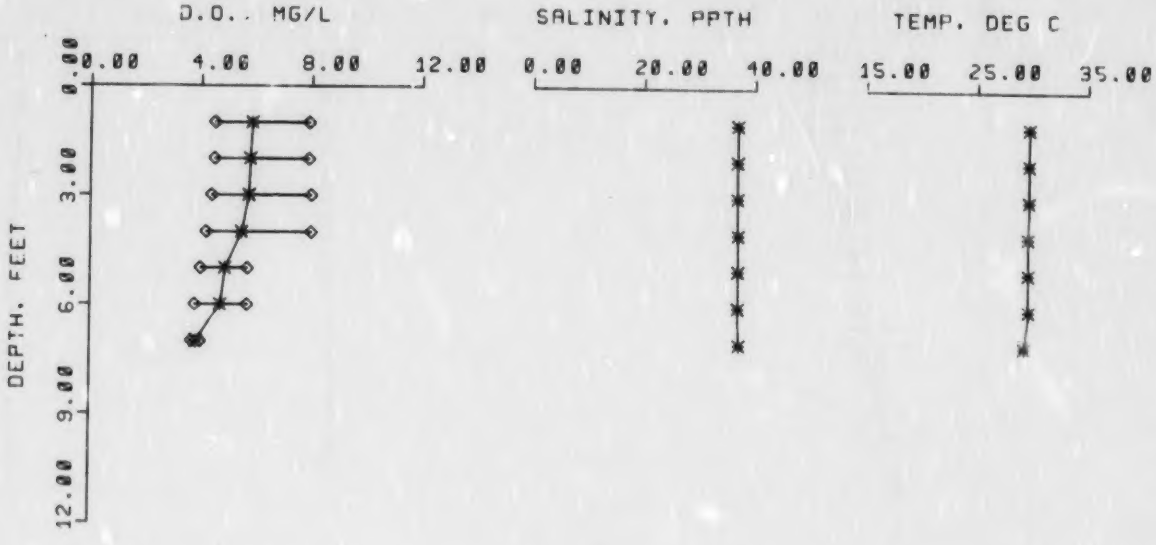


SA-17 AUG 74



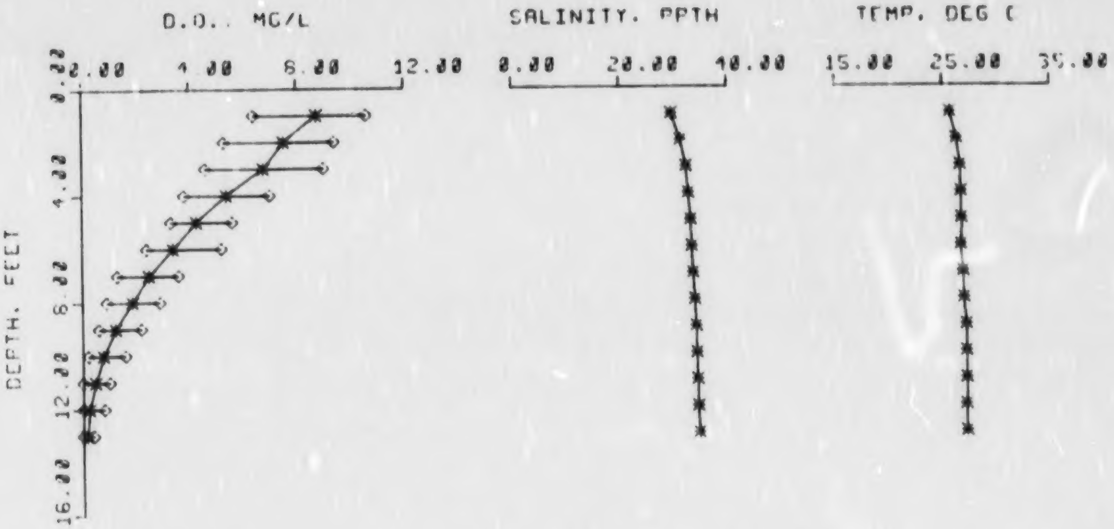
SA-18 AUG 74

FIGURE 63
PROFILES
SEA AIR ESTATES

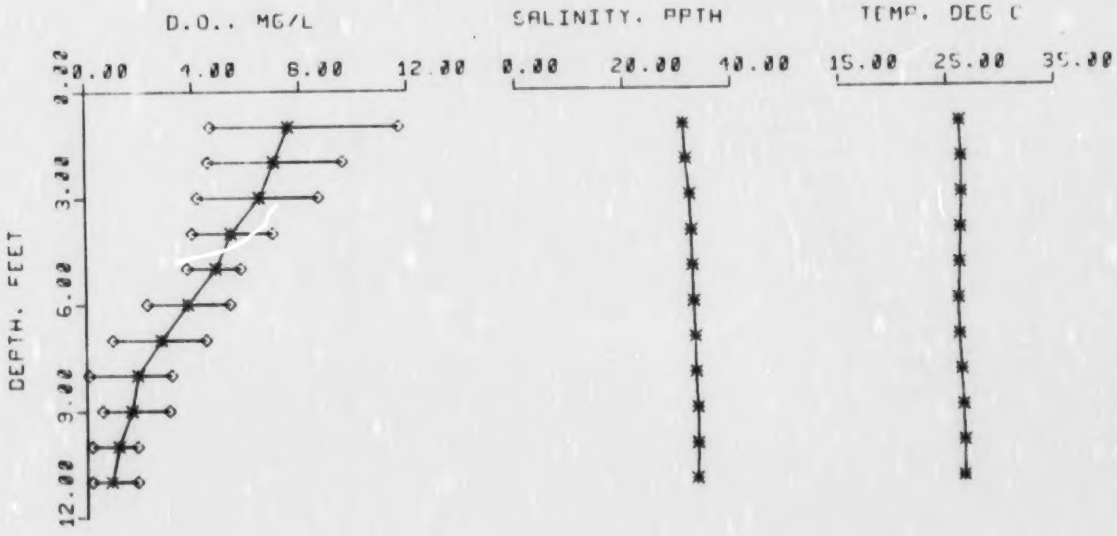


SA-19 AUG 71

FIGURE 64
PROFILES
ATLANTIC BEACH

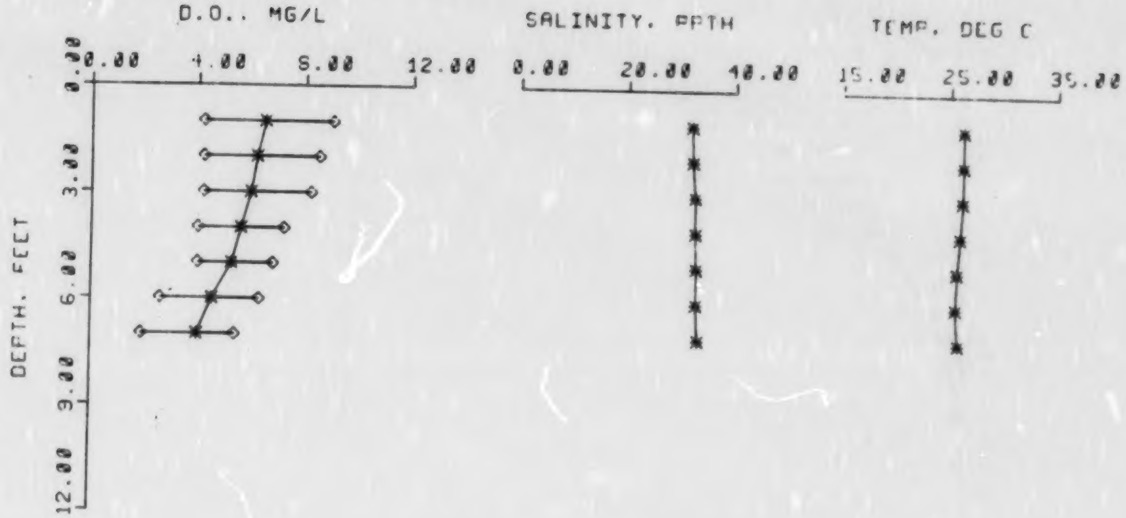


AB-01 SEP 74

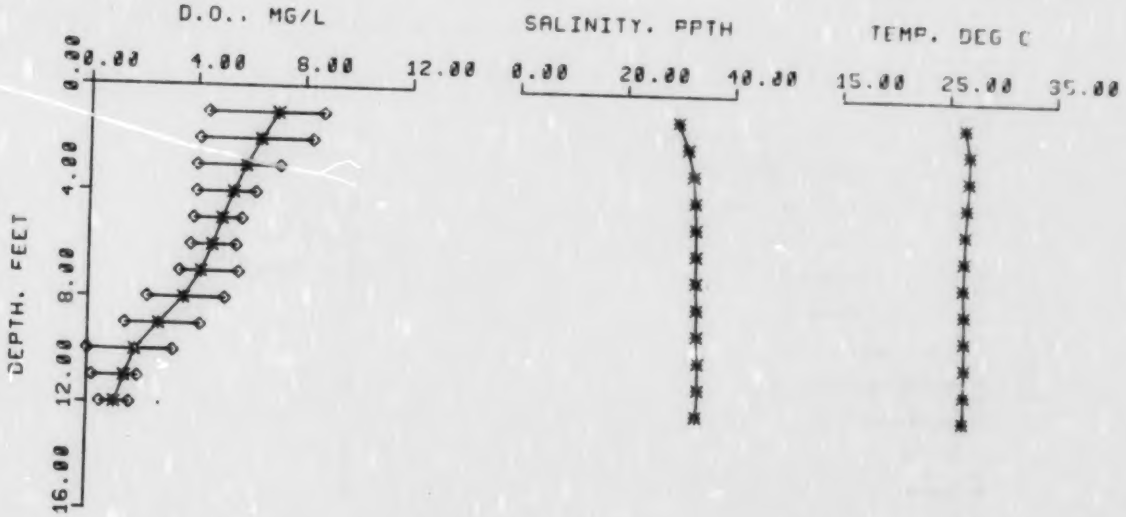


AB-02 SEP 74

FIGURE 65
PROFILES
ATLANTIC BEACH

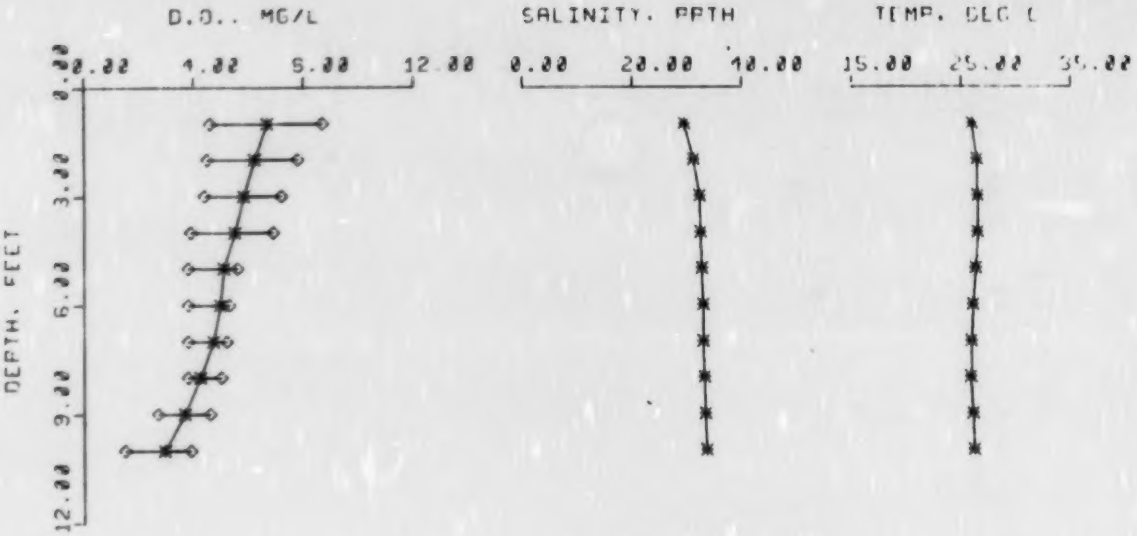


AB-03 SEP 74

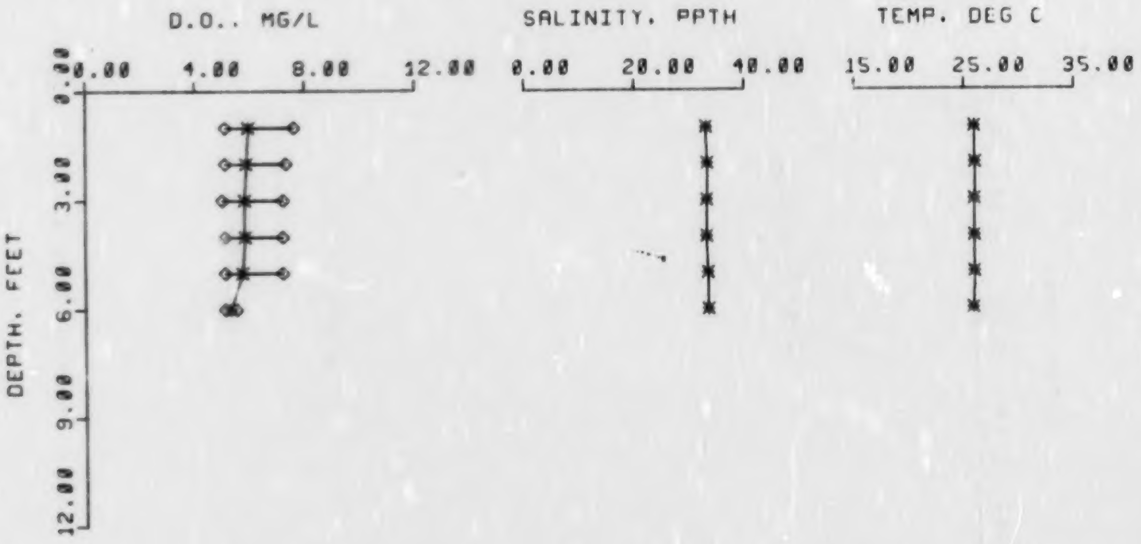


AB-04 SEP 74

FIGURE 66
PROFILES
ATLANTIC BEACH

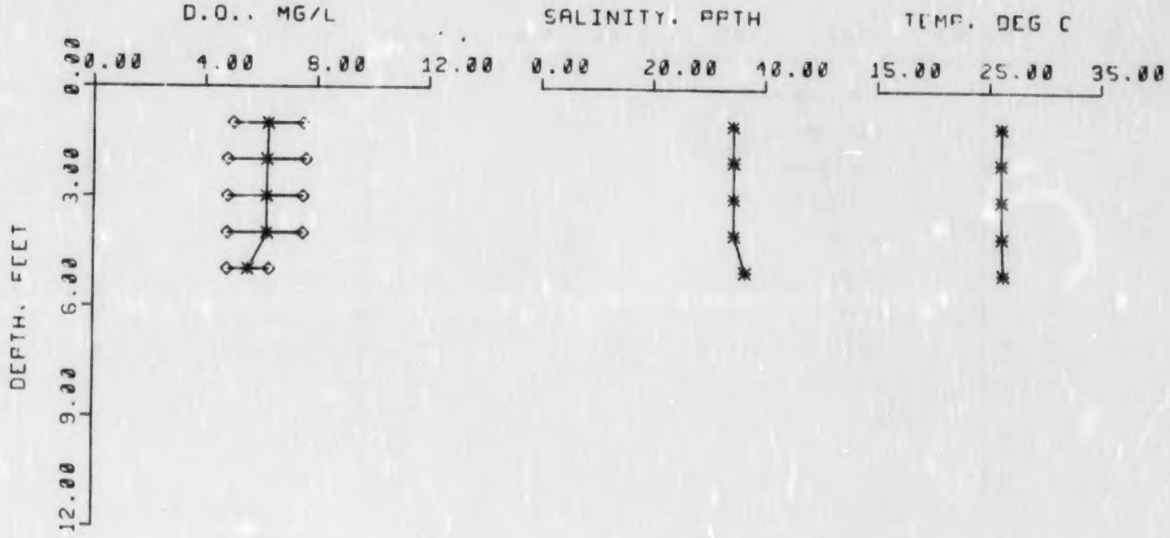


AB-05 SEP 74

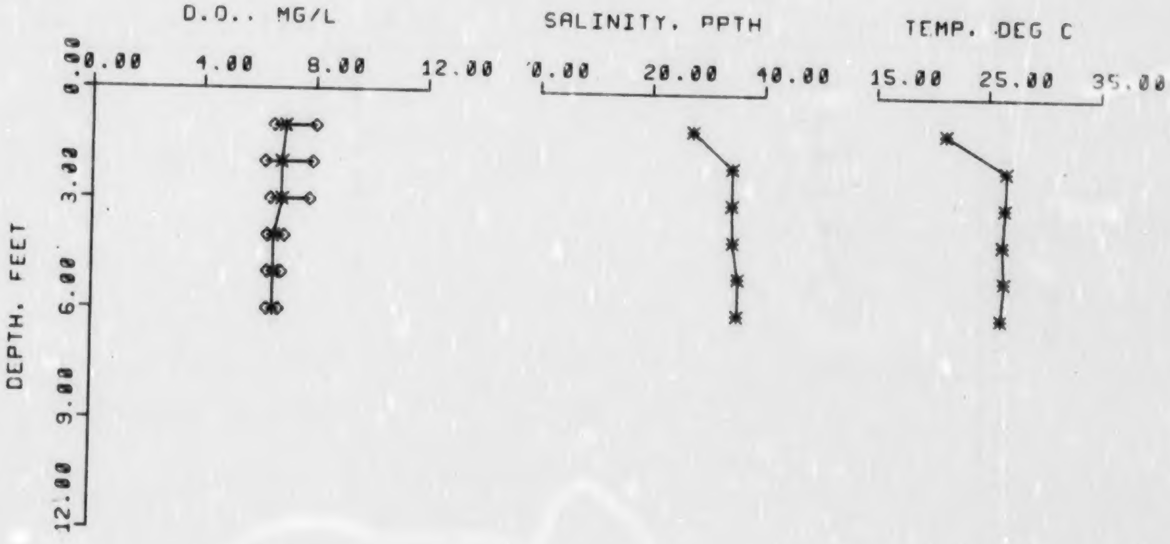


AB-06 SEP 74

FIGURE 67
PROFILES
ATLANTIC BEACH

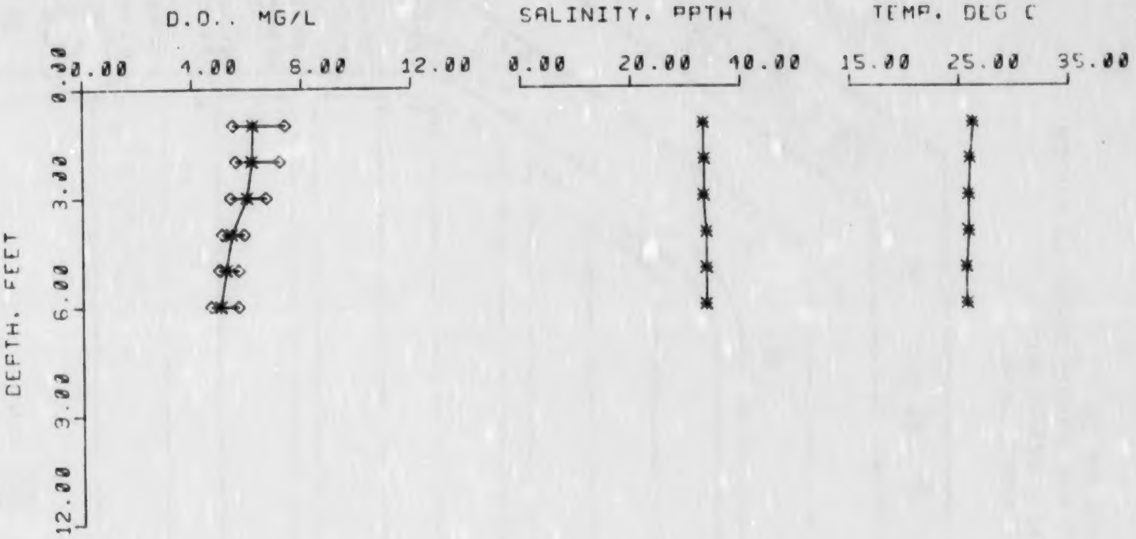


AB-07 SEP 74

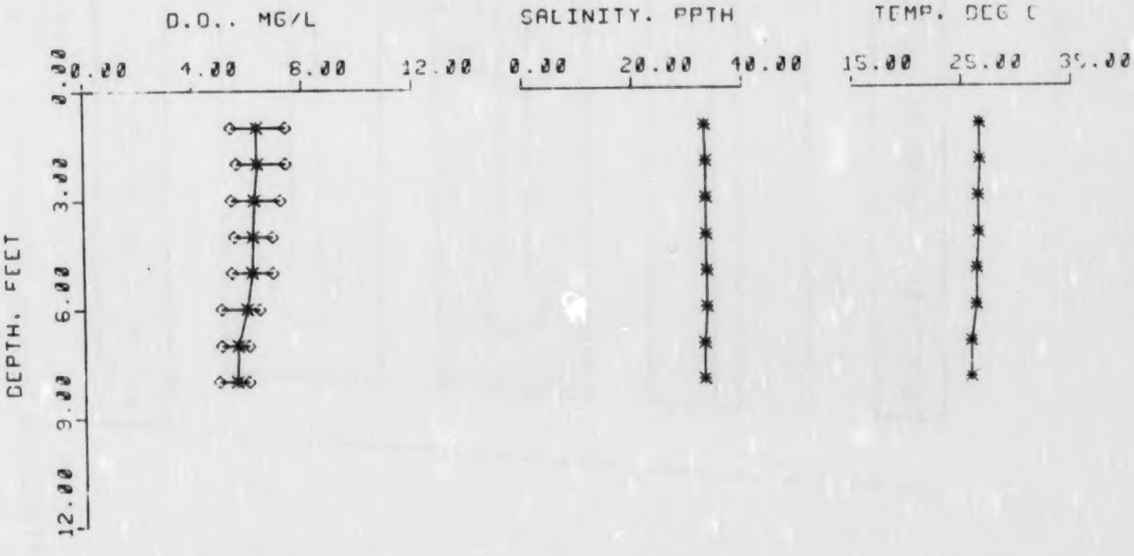


AB-08 SEP 74

FIGURE 68
PROFILES
ATLANTIC BEACH

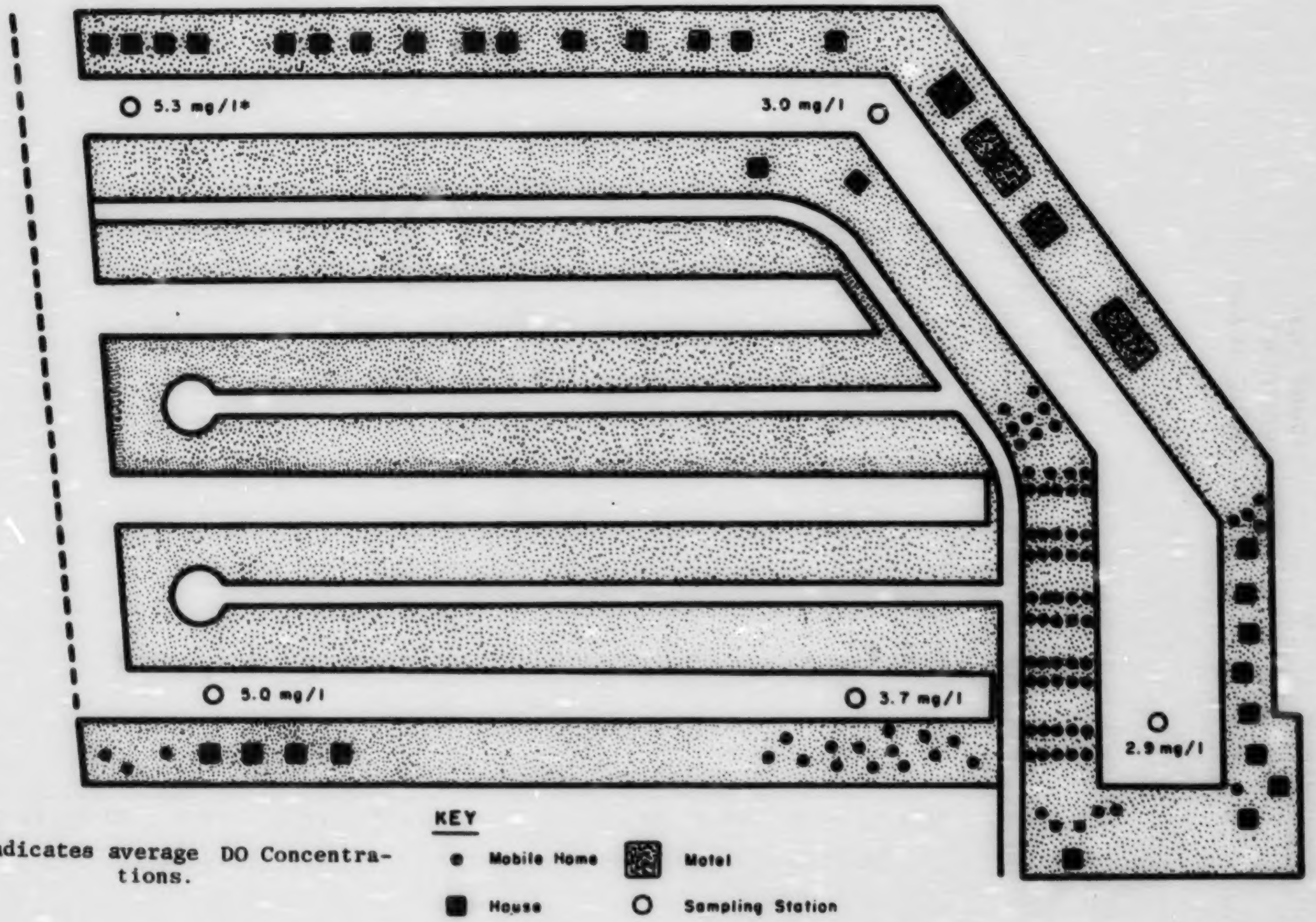


AB-09 SEP 74



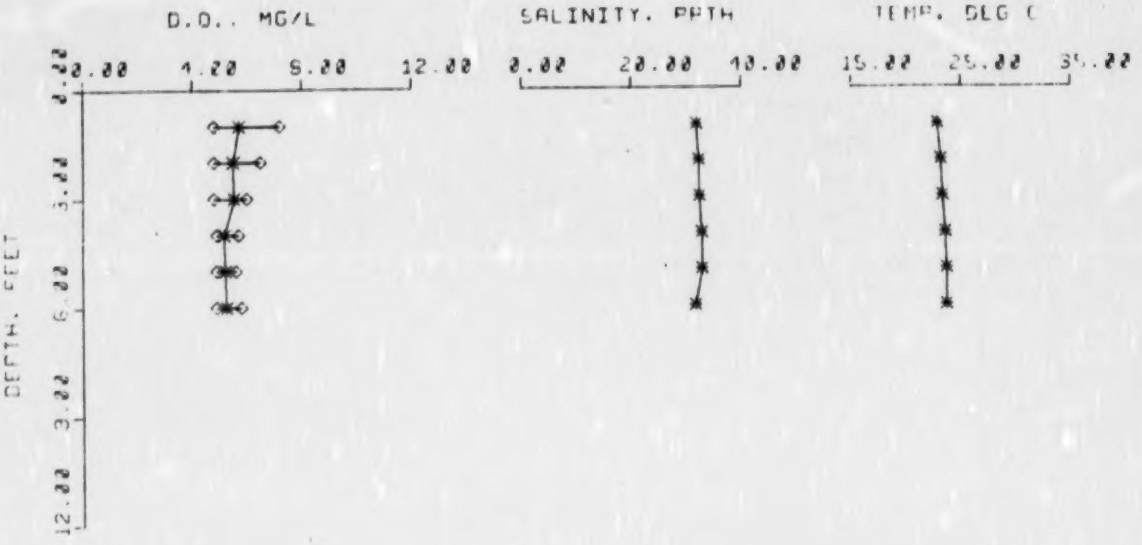
AB-10 SEP 74

FIGURE 69
HOUSING UNIT DENSITY AND AVERAGE DISSOLVED OXYGEN
ATLANTIC BEACH, N.C.
SEPTEMBER, 1974

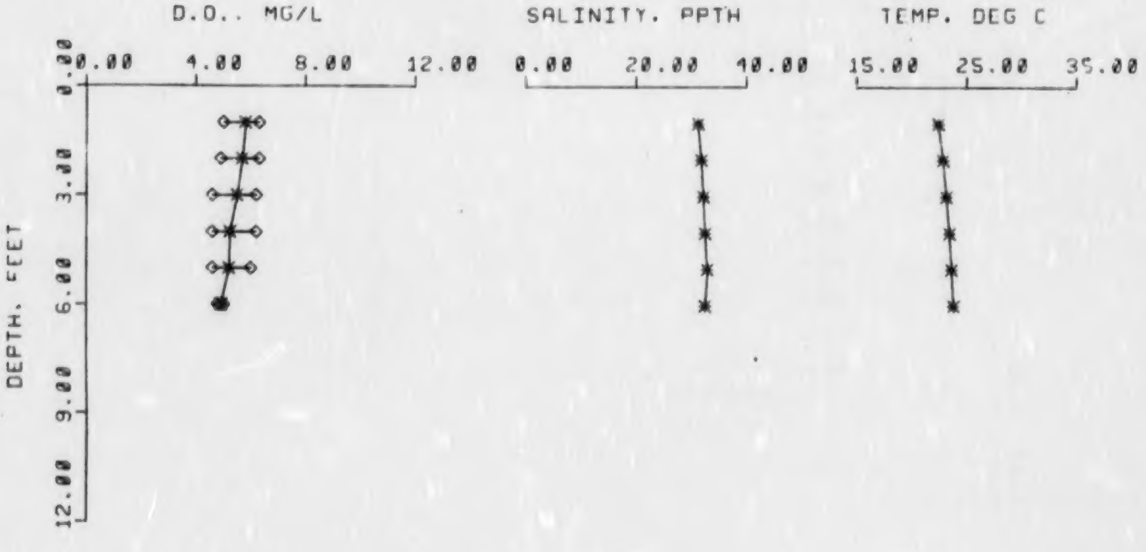

5.3 mg/l*
3.0 mg/l
5.0 mg/l
3.7 mg/l
2.9 mg/l
KEY
Mobile Home
Motel
House
Sampling Station

*Indicates average DO Concentrations.

FIGURE 70
PROFILES
SPOONERS CREEK

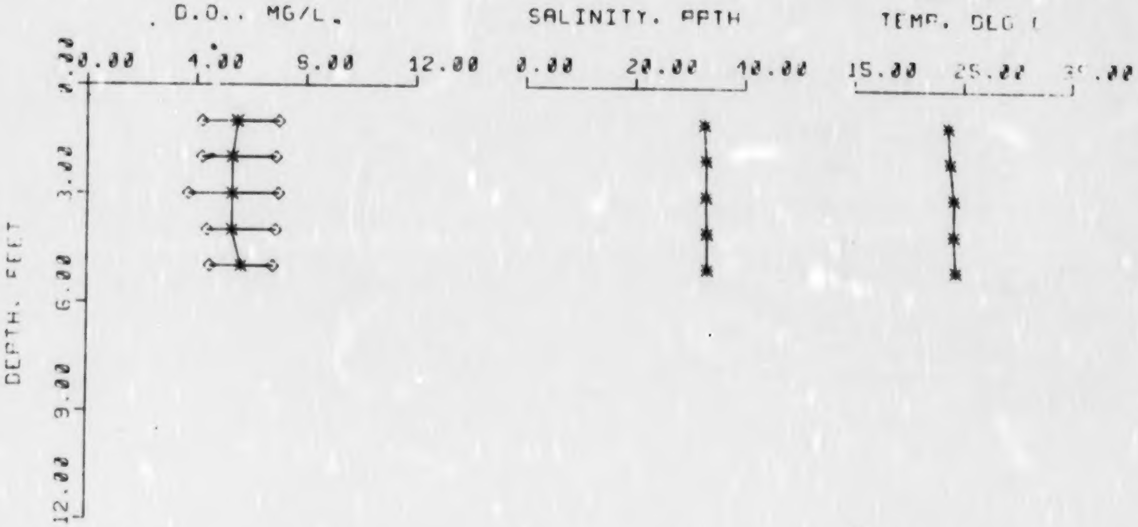


SC-01 SEP 74

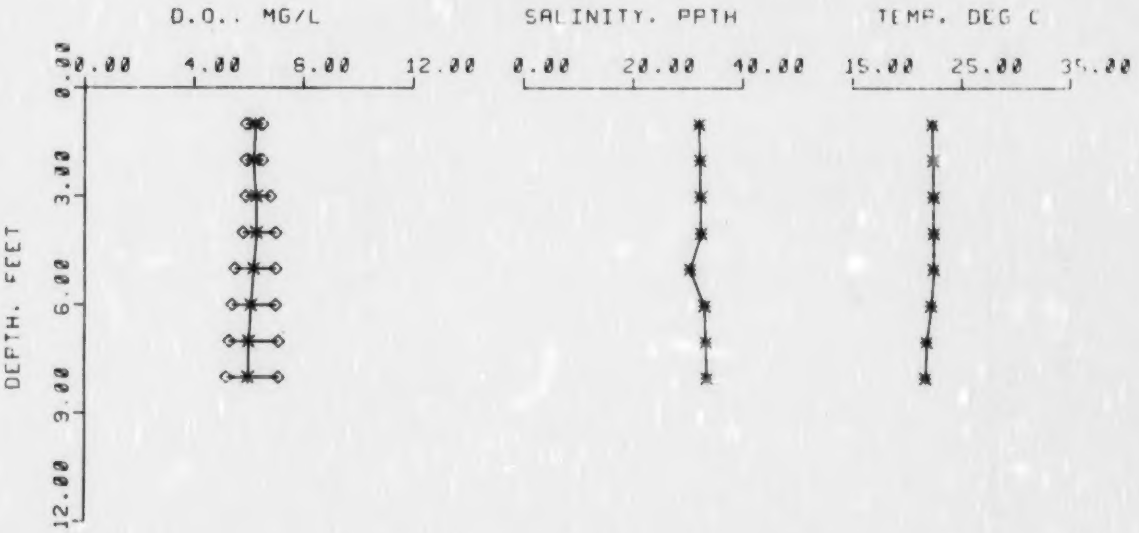


SC-02 SEP 74

FIGURE 71
PROFILES
SPOONERS CREEK

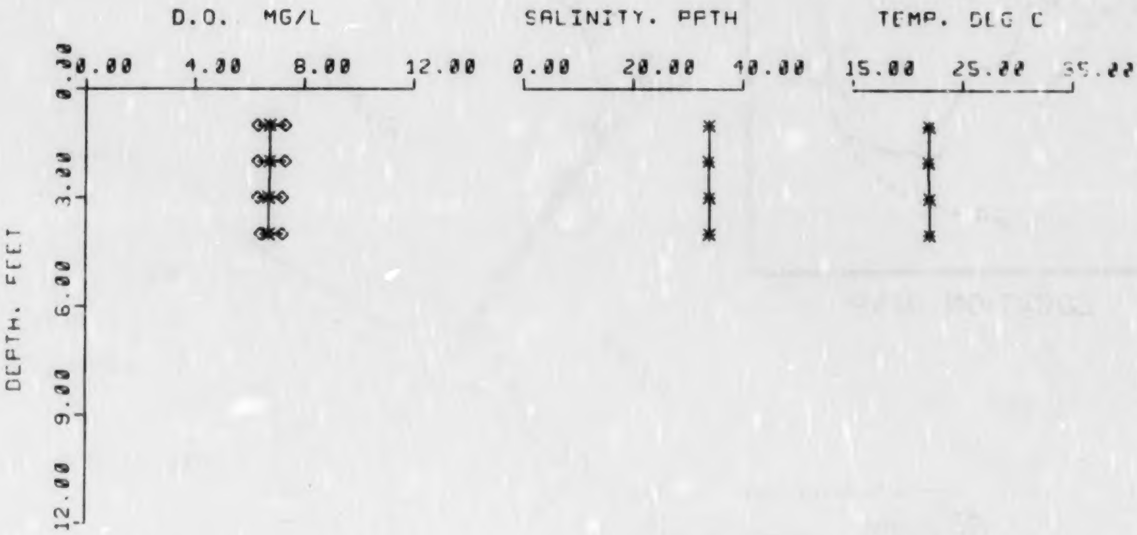


SC-03 SEP 74

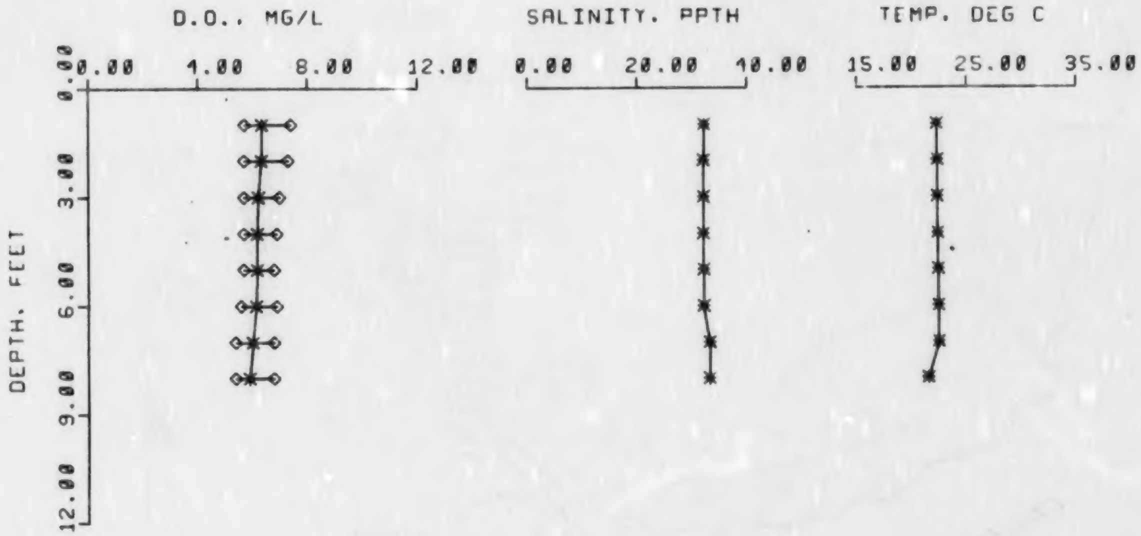


SC-04 SEP 74

FIGURE 72
PROFILES
SPOONERS CREEK



SC-05 SEP 74



SC-06 SEP 74

FIGURE 73
TOTAL PHOSPHORUS AND TOTAL NITROGEN CONCENTRATIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

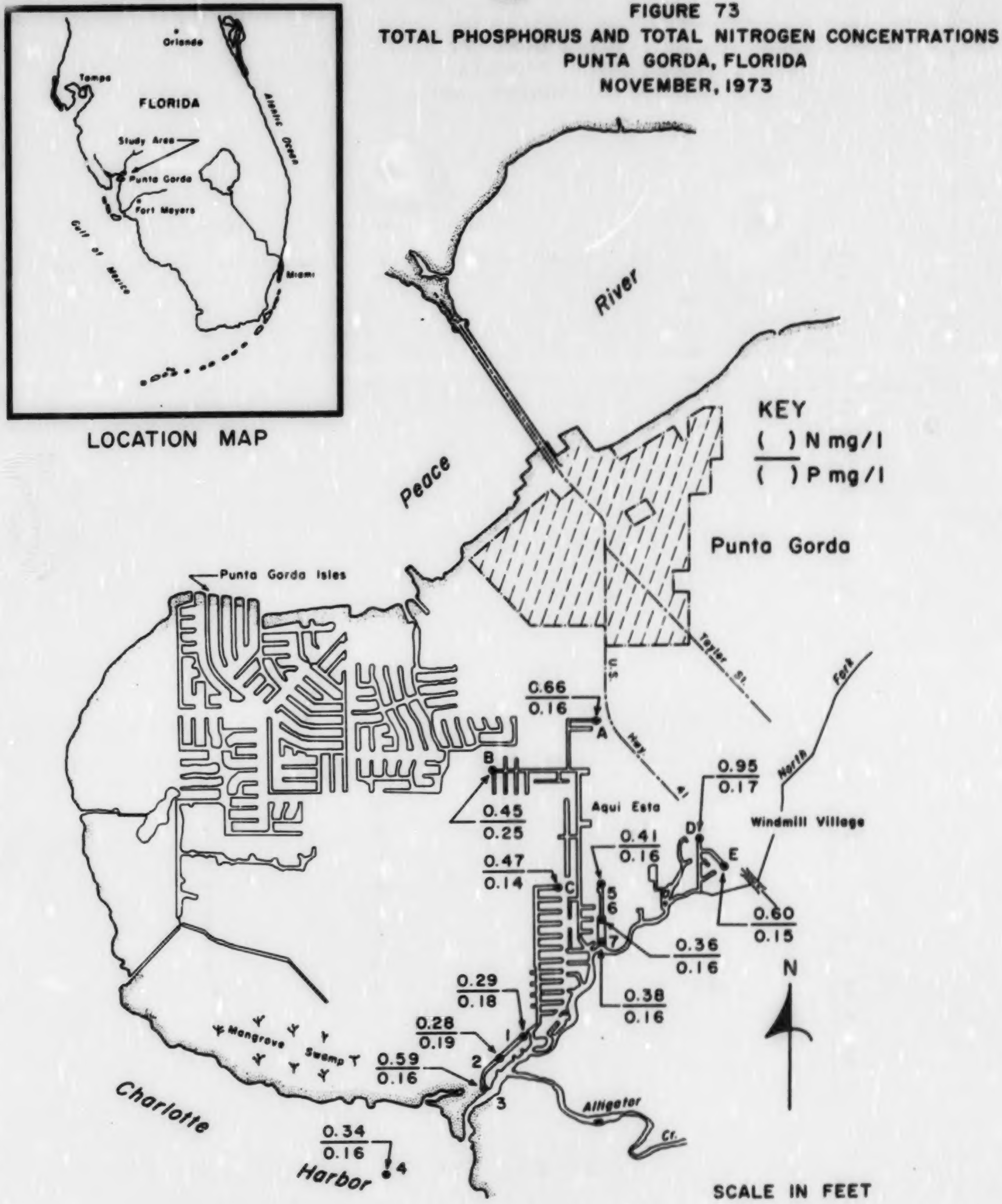
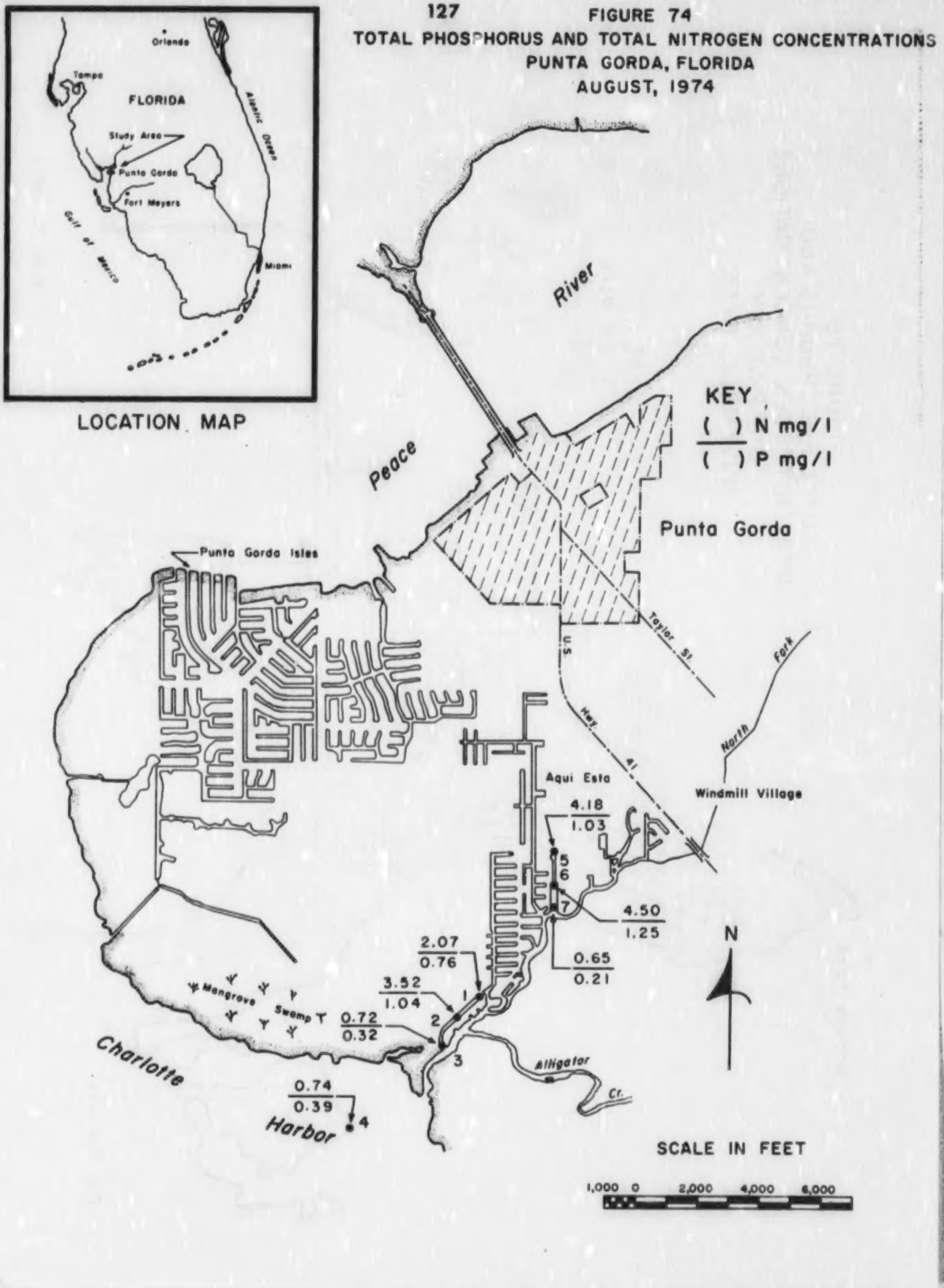

Orlando
Tampa
FLORIDA
Atlantic Ocean
Study Area
Punta Gorda
Fort Meyers
Gulf of Mexico
Miami
LOCATION MAP
River
Peace
KEY
( ) N mg/l
( ) P mg/l
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy 41
North Fork
0.66
0.16
A
B
0.45
0.25
Aqui Esta
0.95
0.17
D
Windmill Village
0.41
0.16
E
0.47
0.14
C
5
6
7
0.60
0.15
0.36
0.16
0.38
0.16
N
0.29
0.18
0.28
0.19
1
2
0.59
0.16
3
Mangrove Swamp
Charlotte
Alligator Cr.
0.34
0.16
4
Harbor
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 74
TOTAL PHOSPHORUS AND TOTAL NITROGEN CONCENTRATIONS
PUNTA GORDA, FLORIDA
AUGUST, 1974


Orlando
Tampa
FLORIDA
Study Area
Punta Gorda
Fort Meyers
Gulf of Mexico
Atlantic Ocean
Miami
LOCATION MAP
Peace
River
KEY
( ) N mg/l
( ) P mg/l
Punta Gorda
Punta Gorda Isles
Taylor St
U.S. Hwy 41
North Fork
Aqui Esta
Windmill Village
4.18
1.03
5
6
7
4.50
1.25
0.65
0.21
2.07
0.76
1
3.52
1.04
2
0.72
0.32
3
0.74
0.39
4
Mangrove Swamp
Charlotte
Harbor
Alligator Cr.
N
SCALE IN FEET
1,000 0 2,000 4,000 6,000

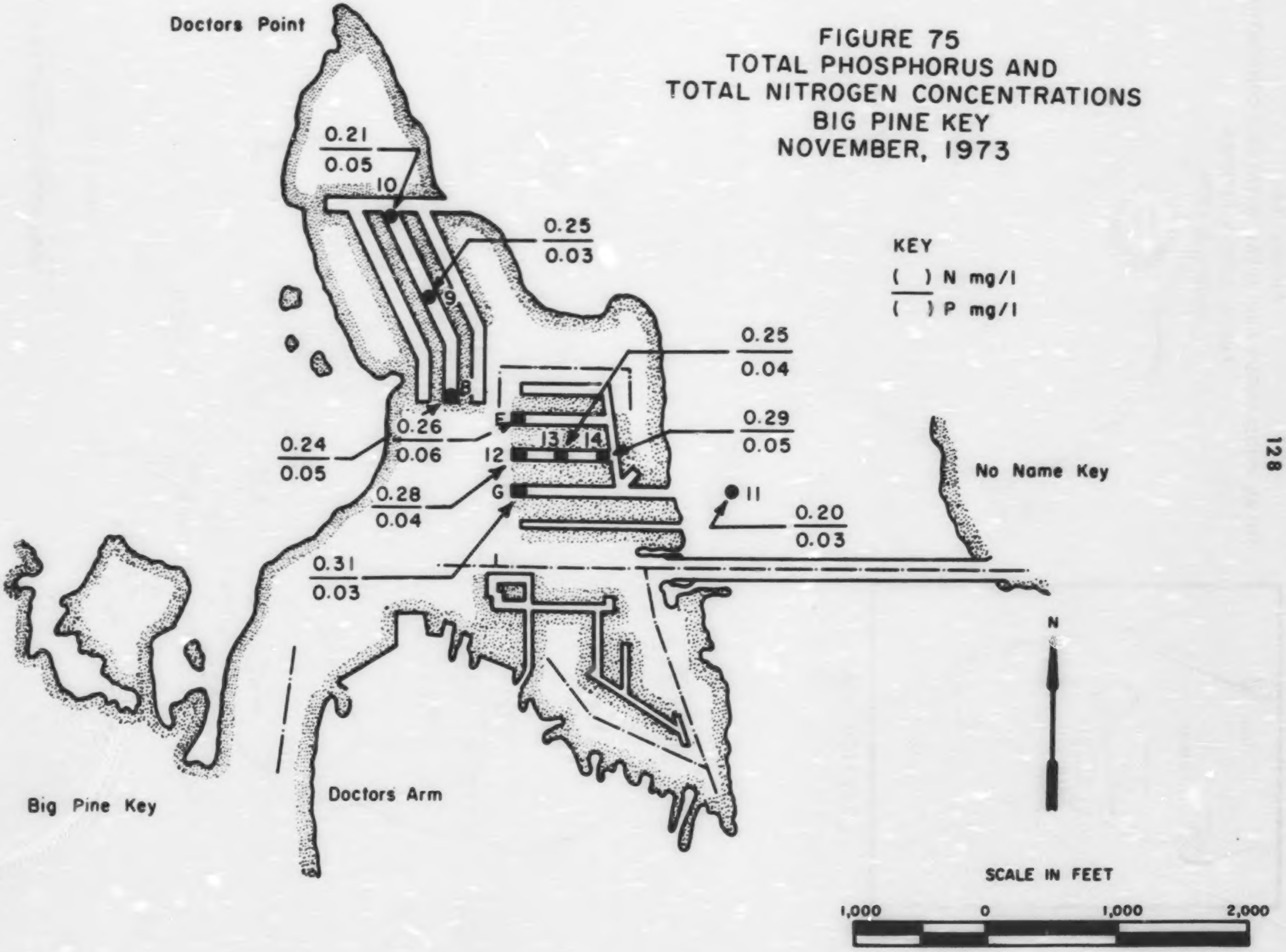
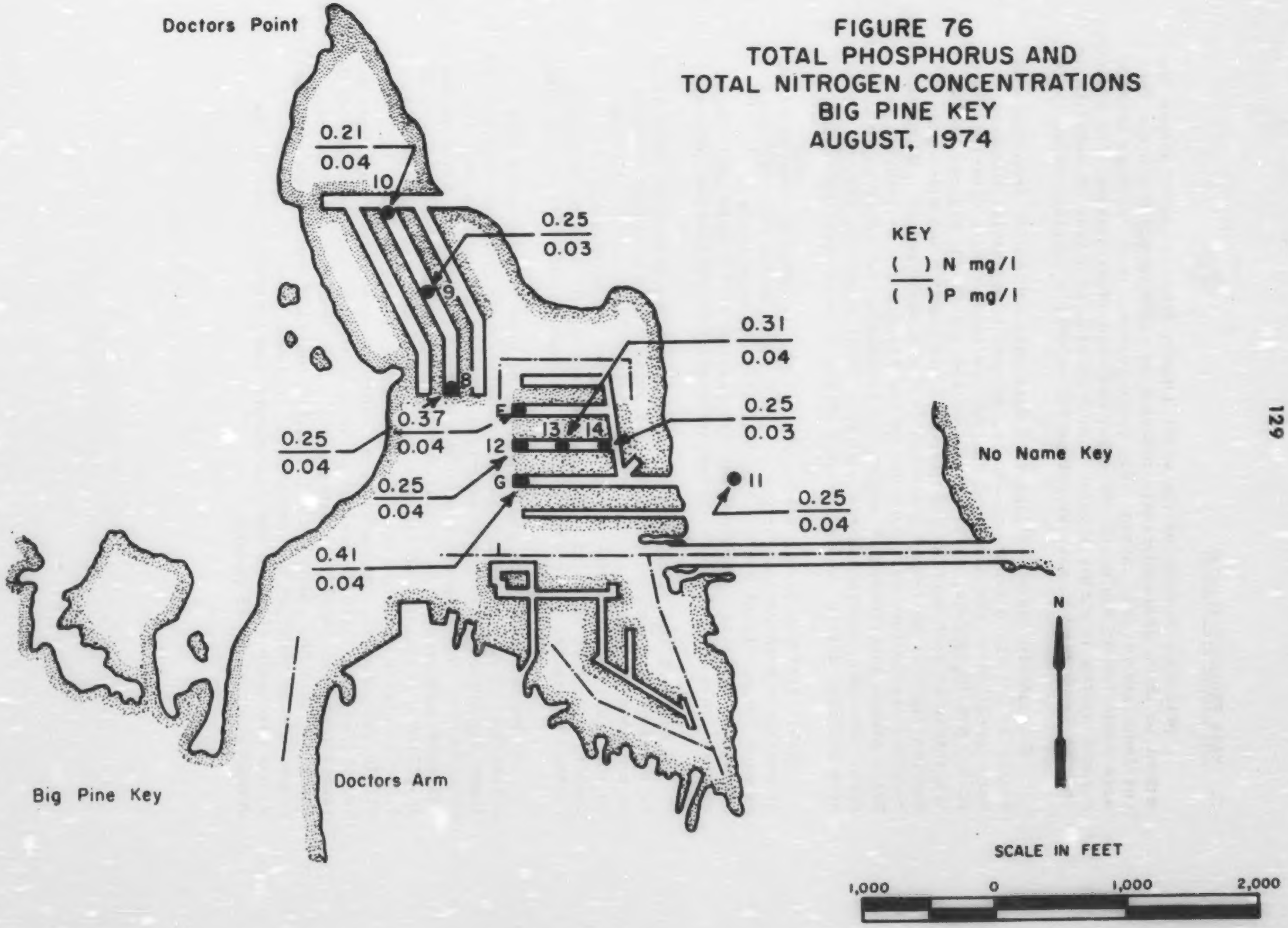


FIGURE 75
TOTAL PHOSPHORUS AND
TOTAL NITROGEN CONCENTRATIONS
BIG PINE KEY
NOVEMBER, 1973

Doctors Point
0.21/0.05
10
0.25/0.03
9
8
KEY
( ) N mg/l
( ) P mg/l
0.25/0.04
0.29/0.05
F
13
14
12
G
0.24/0.05
0.26/0.06
0.28/0.04
11
0.20/0.03
No Name Key
0.31/0.03
N
Big Pine Key
Doctors Arm
SCALE IN FEET
1,000
0
1,000
2,000

FIGURE 76
TOTAL PHOSPHORUS AND
TOTAL NITROGEN CONCENTRATIONS
BIG PINE KEY
AUGUST, 1974


Doctors Point
KEY
( ) N mg/l
( ) P mg/l
0.21 / 0.04
10
0.25 / 0.03
9
8
0.37 / 0.04
0.25 / 0.04
E
12
G
13
14
0.31 / 0.04
0.25 / 0.03
0.25 / 0.04
0.41 / 0.04
11
0.25 / 0.04
No Name Key
N
Big Pine Key
Doctors Arm
SCALE IN FEET
1,000
0
1,000
2,000

C. MASS EXCHANGE STUDIES

A principle element of the water quality studies was to assess the extent to which dead-end canals function as sinks or point sources for nutrients and organic carbon. For these reasons, mass exchange studies were conducted at the mouths of eight dead-end canal systems. To identify a canal system as either a point source or sink is a task of determining the imbalance between mass export or import over a complete tidal cycle.

To quantify export or import of nutrients and solids from dead-end canals to adjoining receiving waters, automatic sequential samplers were installed at the mouths of the primary study canals (Stations PG-03, PG-07, BPK-10, BPK-14, SA-18, AB-03, AB-05, and AB-10, Figures 29-33). The intake of each sampler was placed at mid-channel and mid-depth with samples taken at half-hour intervals over a 25-hour period. Water samples received appropriate preservatives in the field and were returned to EPA's Athens laboratory for analytical processing for total organic carbon, total nitrogen, and phosphorus content. Tidal stages in the study canals were recorded during the full course of the 25-hour sampling period.

Table XXII represents the results of the exchange studies in terms of average concentration for the combined tidal phases (ebb or flood) of each 25-hour tidal cycle. Mass calculations were based on the average concentration reported for the combined tidal phase and the measured volume of the tidal prism exchanged for the combined phases.

Results of the tidal exchange studies are summarized in Table XXIII in terms of mass (kg) of nutrients and organic carbon either imported to or exported from each canal over a 25-hour tidal cycle. As shown in the table, a minus sign (-) denotes import and a plus sign (+) denotes export of material. To consider the canals as a point-source system, the reader needs only to focus on those values with a plus sign.

At Punta Gorda, both the developed and undeveloped canals were stratified (i.e., two-layer systems). Both canals characterized systems importing organic carbon and exporting nitrogen and phosphorus. The magnitude of these exports are judged as being significant based on the following comparison. A typical activated sludge treatment plant yields an effluent containing an average load of 0.05 kg total nitrogen and 0.01 kg total phosphorus per 1,000 gallons of discharge (14 & 15). Within this context, the undeveloped canal exported a total nitrogen and phosphorus load (kg/day) equivalent to a 26,000 and 36,000-gallon-per-day sewage treatment facility, respectively. The developed canal would translate into the equivalent of a 30,000 and 23,000-gallon-per-day facility respective to nitrogen and phosphorus. However, the tidal prism volume (exchange flow) of the undeveloped canal exceeded that of the developed canal by 25 percent.

The potential for an increase in the export load of the two canals remains greater in view of the fact that nitrogen and phosphorus are stored in the bottom strata of the canals during periods of stratification. The physics of the stratification would tend to restrict tidal volume exchange with the surface strata; thus, the export of nutrients at the time of our study would constitute only a partial relief of the total nutrient pool confined to the canal system. Ultimately, the two canals would destratify with the coming of the dry season; and much, if not all, of the nitrogen in solution (mainly ammonia) will be exported from the system. The developed canal total nitrogen pool was nearly 50 kilograms in excess of the undeveloped canal.

Without the benefit of mass exchange studies during the dry season, we can only approximate the potential for nutrient export on the basis of the November 1973, water quality sampling at slack low and high tide. The principle assumption involved in this approximation is that the slack low and high water concentration represented the average concentration over the course of the ebbing and flooding tides, respectively. In the case of the developed canal, the ebbing concentration for total nitrogen in November remained the same as observed in August. Thus, the developed canal was likely exporting nitrogen loads of the approximate magnitude reported for August. However, the undeveloped canal system was favoring an import of both nitrogen and organic carbon in November. Obviously, the nutrients trapped in the stratified layer are flushed from the canals in this relatively short period (August-November).

Mass exchange studies at Big Pine Key show both the developed and undeveloped canals exporting organic carbon and nitrogen (Table XXIII). However, quantities of export were small. The export of organic carbon could be coupled to the detrital yield of benthic attached plants.

The Sea Air Estate Canal at Marathon showed no measurable export of either nutrients or organic carbon. This feature was not unexpected on the basis of depth, size (volume) of the canal, and absence of development. Attached vegetation (source of detritus) was limited to the canal walls of some of the finger canals which radiated from a large Central basin (Figure 31). Benthic attached plants were virtually absent from the deep canals (to 25 feet).

At Atlantic Beach, the heavily developed canal featured no export but instead imported organic carbon and nitrogen in large quantities (Table XXIII), which were being retained by the canal system. The retention was probably related to the size of the canal system (as was the case at Marathon, Florida, and the Sea Air Estate canal).

However, retention of the organic carbon and nutrients was having a serious impact on the canal's environmental conditions. The chemical and biological assimilation of the organic carbon and nitrogen requires an adequate dissolved oxygen resource--which obviously the system fails to support, as evidenced in the DO studies (Figures 64 and 65).

The lightly developed canal at Atlantic Beach appeared to be less of a carbon-nitrogen sink than the above-referred-to-system. This feature would be related to the comparative sizes of the two systems (Figure 33) and the ratio of canal volume to tidal prism. Also, the smaller canal maintained shoreline vegetation along the length of one side of the waterway and undoubtedly added to the detrital resource of the system.

The undeveloped canal was characterized as an exporting system of organic carbon. The quantity of organic carbon leaving the canal was approximately 22 kg; whereas, the nitrogen and phosphorus export was 0.3 and 0.5 kg, respectively. The outflow of organic carbon was probably a reflection of the net productivity of the dense *Spartina* marsh which flanked the entire length of the canal. In total, the marsh constituted about 17.5 acres of vegetation. Detritus originating in the marsh was tidally swept to the canal and integrated into its tidal flushing dynamics. Not all of the detritus entrained into the canal was exported as evidenced by the sediment features of the canal. Referring to Figure 83 of the sediment studies, the vertical profiles of the canal sediment in terms of organic content are similar to the cores taken in the marsh. Unlike either of the developed canals, the undeveloped system was able to assimilate this massive infusion of organic matter without exceeding the DO resources of the waterway.

TABLE XXII

Tidal Exchange Study

Average Concentration of Tidal Phase
Finger-Fill Canals, August-September 1974

Location	Station	Tidal Phase*	Exchange Volume (cu ft)	Average (mg/l)				
				TOC	Org. N	NH_3	NO_2-NO_3	T-Phos
Punta Gorda	PG-03	Ebb	603,840	15.58	0.59	0.13	0.04	0.33
		Flood	648,240	15.43	0.54	0.12	0.02	0.31
	PG-07	Ebb	455,600	14.74	0.51	0.14	0.02	0.22
		Flood	489,050	15.29	0.51	0.10	0.01	0.20
Big Pine Key	BPK-10	Ebb	124,800	1.86	0.16	0.06	0.01	0.04
		Flood	124,800	1.75	0.14	0.06	0.01	0.04
	BPK-14	Ebb	43,500	1.86	0.14	0.10	0.01	0.04
		Flood	43,500	1.86	0.15	0.08	0.01	0.03
Marathon	SA-18	Ebb	825,000	1.00	0.07	0.05	0.05	0.03
			925,000	1.00	0.08	0.04	0.08	0.03
Atlantic Beach	AB-03	Flood	1,826,840	3.45	0.22	0.09	0.01	0.04
		Ebb	1,810,080	3.31	0.13	0.09	0.01	0.03
	AB-05	Flood	697,600	2.40	0.17	0.10	0.01	0.05
		Ebb	691,200	2.55	0.18	0.08	0.01	0.04
	AB-10	Ebb	1,875,000	2.76	0.12	0.09	0.01	0.07
		Flood	1,725,000	2.34	0.14	0.07	0.01	0.06

*Combined volume exchanged for ebb or flood phases of 24-hour tidal cycle.

Table XXIII. Net mass exchange for 24-hour tidal cycle, finger fill canals, August-September 1974.

Location	Station	Mass kg/day*		
		TOC	Total N	Total P
Punta Gorda				
Undeveloped canal	PG-03	-2.65	+1.30	+0.36
Developed canal	PG-07	-7.08	+1.51	+0.23
Big Pine Key				
Undeveloped canal	BPK-10	+0.39	+0.06	0.00
Developed canal	BPK-14	+0.01	+0.01	0.00
Marathon				
Undeveloped canal	SA-18	0.00	-0.82	0.00
Atlantic Beach				
Heavily developed canal	AB-03	-7.44	-4.65	-0.52
Lightly developed canal	AB-05	-2.94	-0.28	-0.02
Undeveloped canal	AB-10	+22.34	+0.32	+0.53

*Minus sign (-) denotes net import to canal; plus sign (+) denotes net export from canal.

NOTE: Mass concentrations were computed from average phase concentration (Table XXII) times the average tidal prism volume.

D. Sediments

Estuarine sediments provide a focal point for considering a variety of physical, chemical, and biological features of a canal system. Sediments represent the past accumulation of mainly finely divided particles of inorganic and organic character. In most cases, sediments are hierarchically organized on the basis of particle size, density of matter and prevailing hydraulic features of the overlying water mass.

Keyed to this orginzational nature of sediments and their chemical composition are the benthic communities of plants and animals. The kinds, quantities, and activities of these communities provide a basis from which the quality of the aquatic environment may be judged and compared.

A microbial community serves the benthic system in two important functions. First, bacteria serve as food for a variety of grazing invertebrate animals. Second, and equally important, microbes remineralize influxing organic detritus. Under aerobic conditions, decomposition of organic material proceeds with the bacterial activity leading to some conservation and accumulation of select nutrients in the sediments. For example, the organic nitrogen portion of the substrate being decomposed is temporarily retained in the sediments in the form of bacterial biomass, while the ingested carbon is vented to the water column as CO_2--a product of respiration. As the supply of organic material in the substrate is exhausted, remineralization lessens and the standing stock of microbes is reduced; hence, the quantity of organic nitrogen in the sediments is also reduced. Anaerobic remineralization is similar to aerobic remineralization except at reduced rates and often at end points of partial decomposition. In the absence of free dissolved oxygen, microbes are dependent on sulfate and nitrites-nitrates as a supply of metabolic oxygen for respiration. In marine environments, sulfate reduction leads to production of hydrogen sulfide (H_2S) gas which is toxic to many animals. Nitrite-nitrate reduction leads to the production of ammonia (NH_3) which can also be toxic. A relative measure of the state of organic decomposition in sediments could be the ratio of organic carbon to nitrogen (C:N) of the substrate. A lower ratio indicates a more advanced state of decomposition while an increase in the ratio represents less progress in remineralization.

Essential to the establishment, growth, and maintenance of a benthic community of invertebrate animals are the chemical and physical composition of sediments and water. Composition of sediments in terms of particle size (texture) is of key importance to life styles of numerous animals. For example, burrowing tube-dwelling forms of animals are often associated with soft, finely divided sediments such as mud and silt. Free-living types are found in association with coarse, possibly firmer, material like sand. Chemical conditions associated with sediments bear heavily on the structure of the benthic animal community. Presence of non-living organic matter in bottom deposits is a natural consequence of detrital input into estuaries. Although this material is vital to benthic animals, excessive accumulations of this matter can pose a liability to the community. Remineralization of the material places added demands on the DO budget. With insufficient resources of free dissolved oxygen, the system becomes anaerobic and toxic gases are generated. This toxicity leads to a reduction in the kinds and number of organisms present in order of their tolerance to the toxic agent.

General study areas and sampling locations are indicated in Figures 29,30, 31, 32, 33, and 34. Nearly all of the general water quality stations were used in the sediment investigations. Vertical cores of canal sediments were obtained with a clear plastic tube 5 cm in diameter and 150 cm long. A transect perpendicular to shore was established at each canal station. Cores were taken at mid-channel and at quarter points to the left and right of center by a diver who, by hand, gradually forced the tube into the bottom until the point of refusal was reached. The tube was then capped and extracted and returned to the boat for processing. Each core was measured for length and percent compaction:

$$\frac{\text{length of core}}{\text{length of tube penetration}} \times 100$$

This procedure was followed by visual inspection of the core to identify and measure apparent zones of sediment stratification. Each zone was extruded from the tube, a sub-sample was obtained, frozen and returned to the laboratory for organic matter content, particle size composition, and sulfide content analyses. The latter two analyses were performed on only the top 10 cm increment of the core taken from mid-channel at each station. In addition, grab samples of the sediment were obtained and analyzed for the chemical parameters identified in Tables XXIV and XXV. All analyses were performed with procedures recommended by EPA (16 & 17).

1. Carbon and Nitrogen Ratios

At Punta Gorda, vertical and longitudinal distribution of organic matter (volatile solids) in sediments of Canals I and II are reported in Appendix D-1.1 and illustrated in Figures 77 and 78. Organic material tended to decrease in concentration with distance from the dead-end area of both waterways. Although reported flushing rates for the two canals were significantly different, longitudinal distribution of sediments appears to be more related to tidal velocities and size of particles.

Common to any dead-end canal system is a regimentation of tidal velocities that approach maximization at the seaward end of the system during a tidal exchange. Coarser particles (those of greatest density) would tend to accumulate to highest levels near the mouth of the system, thus leaving finer matter to become concentrated near the end of the canal. Fine sand was the dominant size class of sediment particles in the two canals (Appendix D-2.1), and it obtained greatest representation at the mouths of each canal (Stations 3 and 7); the opposite trend was true for the finer particles (silt).

Canal I (undeveloped) exceeded Canal II (developed) in the accumulation of sediments of richer organic content. Based on the carbon to nitrogen (C:N) ratio of the sediments, there was a disparity between the two canals in the relative state of organic decomposition of bottom materials (Table XXVI). In Canal I, organic C:N ratios were generally greater than ratios reported for Canal II, particularly at the dead-end station of the former canal. Both canals were essentially the same age and serve the same watershed. Apparent differences in the relative state of decomposition lead to the following discussion which identifies subtle contrasts in the character of the two canals.

Along the Gulf Coast, tidal streams function as natural systems for collection and dispersion of detritus to main bodies of coastal estuaries. Initially, detritus is derived as a by-product of plant metabolism and is incorporated into a sestonic transport system. This material usually consists of tiny bits of plant matter whose size class ranges from the soluble state to less than 0.8 microns.

Sources of detritus common to both canals were mangrove swamps, salt marshes, and upland vegetation with the latter inputs peaking during periods of land runoff. The August mass exchange studies show that both canal systems were importing detritus and suggested the same held true for November. Canal I may have had some advantages in the scheme of detrital recruitment because of its natural orientation to Alligator Creek. Canal I was fashioned from a natural tidal creek which may not have been excavated near its mouth (Figure 29); Canal II was oriented for the convenience of development.

Auxiliary to the above sources of detritus was an unquantified supply of organic matter input from septic tank drainage (see section E) and street runoff. Qualitative differences (physically and chemically) between organic matter derived from vegetation and domestic sewage would be substantially different. Plant detritus would remineralize more slowly, be void of animal protein except in bacteria, and be rich in cellulose fiber. Septic tank leachates, however, represent organic matter rich in soluble proteins and amino acids and convenient for rapid microbial assimilation.

To add some perspective to the sediment's level of organic decomposition, the C:N ratios associated with the common coastal marsh plant, Spartina, were considered. The living plant yields a C:N ratio of 45:1; but with decomposition, the yield can be reduced to 11:1 (Odum, E. P. as cited in Russell Hunter, (18)). Assuming that other marsh plants, including mangroves, yielded similar C:N ratios, remineralization of bottom debris in Canal I was less complete based on an average C:N ratio of 22:1 as compared to the more stabilized sediments of Canal II with an average C:N ratio of 15:1. Apparently, any loading of Canal II with organic matter from domestic waste sources has had no detectable impact on the decomposition state of sediments. However, this auxiliary source of organic enrichment poses potential liabilities on the dissolved oxygen regimen. Solubilized matter (amino acids, proteins) can be rapidly entrained into the microbial processes of decomposition before entry into sediments. Remineralization of this matter places added demands on the DO budget of the canal. Referring to Figures 45 and 46, absolute values for DO concentrations were consistently lower in Canal II than in Canal I. Other evidence indicating progress of remineralization in the water column were increased concentrations of inorganic nitrogen over those values reported for Canal I (Table VII). Increased levels of ammonia, nitrites, and nitrates in Canal II over those values reported for Canal I could lead to other perturbations of the system by way of algal blooms.

At Big Pine Key, distribution of organic sediments in Canals III and IV are reported in Appendix D-1.2 and illustrated in Figures 79 and 80. Canal IV contained a greater volume of sediments richer in organic matter than did Canal III. This disparity could be related to several factors--Canal IV was several years older than Canal III, was developed with residential units, and was subject to poorer flushing.

In terms of C:N ratios of sediments, there appeared to be some differences in the relative state of sediment decomposition. Canal III contained sediments with an average C:N ratio of 10 versus a value of 13 for Canal IV. Sediments of the Big Pine Key canals appeared substantially more stabilized in terms of decomposition than the study canals at Punta Gorda. Obviously the Punta Gorda canals receive greater inputs of organic carbon as indicated in the Water Quality Section (Tables VII, VIII, IX, and X).

Canal orientation with respect to prevailing wind direction without the benefit of protective barriers at their entrance are often subject to the effects of windblown detritus as it accumulates in the close-ended systems. This was the case for the two canals immediately south of study Canal IV (Figure [illegible]). At the time of our studies, Canal IV and those canals north of it were not affected. Under conditions of a prevailing northwesterly wind, uprooted and floating fragments of vegetation drifted directly into the canals and, in some cases, accumulated into dense floating mats. Surprisingly, the situation had little effect on the organic composition of sediments at the time of the survey.

With adequate retention time, entrapped vegetation was relieved of its buoyance through decomposition processes. As particulate matter, detritus was available for transport to the bottom or other areas of the system and for entrainment into aquatic food chains. This consideration was tentatively verified. At Station G (Figure 30), floating mats of sea grass choked the canal. Local residents confirmed that this condition was common to the canal and prevailed until the wind direction reversed. At this station, accumulative levels of organic matter in sediments (Figure 80) and accompanying C:N ratios (Table XXXVI) were comparable to values reported for the other stations in the system. The respective parameters were quite similar. Apparently, the settling rate of this material was sufficiently slow to provide a relatively thorough decomposition of vegetation prior to any deposition on the bottom. In support of this contention, dissolved oxygen variations in the system were considered. At Station G, DO concentrations along the vertical plane of the water column followed a "bell shape" distribution (Table XVI). Maximum DO levels occurred at mid-depth, while minimum concentrations developed near surface and bottom regions. Reduced DO levels near the surface reflect respiration requirements of the decomposition processes and lack of reaeration. Depressed DO levels at the bottom indicate benthic oxygen demands which include respiration needs of the benthic plants, as suggested by diel variations in the system (Figures 50 and 51).

Apparently, at the time of these observations, the DO budget of the system at Station G was sufficient to meet the metabolic needs of plants and animals; this allowed decomposition of vegetation to proceed to some stable end point and not degrade the sediments. In the absence of an adequate DO budget, the system could become anaerobic; this would lead to an accumulation of partially decomposed vegetation on the bottom and create a benthic environment suitable for only the most pollution-tolerant animals.

Coupled to the above reported inputs of detritus was the organic matter supplied by the attached plant communities established within the canal systems. In the case of Canal IV, possibly leachates of organic matter from septic tanks could have added to the detrital pool for the system of canals associated with the residentially developed area of Doctors Arm subdivision. At the time of the survey, the combined supply of organic matter to the Canals III and IV appeared to be in balance with the assimilative capacity of the two systems, thus avoiding any serious degradation of the sediments.

Vertical and longitudinal distribution of organic matter in sediments of the Sea-Air Estate canal at Marathon, Florida, are reported in Appendix D-1.4 and illustrated in Figure 81. Compared to Big Pine Key canals, the sediments contained substantially less organic matter. This probably reflects the absence of effects associated with residential development and benthic macroalgae and seagrasses. Aside from differences in the content of organic matter, sediments were very similar in terms of particle size (mainly silt in both cases) and C:N ratios. Particle size data is contained in Appendix D-2.2 and C:N ratios are shown in Tables XXVI and XXVII.

For the Atlantic Beach canals, vertical and longitudinal distribution of organic matter content of the sediments are reported in Appendix D-1.5 and illustrated in Figure 82. Three salient features are indicated in Figure 82.

- The organic content of sediments is approximately 1,000 times greater than heretofore reported for Florida canals.
- Within canals, organic content of sediments was maximized at the dead-end locations.
- Marsh sediments were similar in organic content to sediments of the undeveloped canal and associated approach cannel.

Organic richness of canal sediments in our opinion reflects the organic production of lush Spartina marshes of the coastal region. These marshes constitute the bases of a detrital economy essential to development and maintenance of a vast resource of aquatic life. For discussion purposes, detritus is referred to as small fragments of dead plant material that are tidal flushed from the marsh as particulate matter. Dimensions of these particles are size categorized as extra coarse, fine, and Nanno fractions (2 , 4). Nanno particles being smallest (less than 64 microns) would, of course, be most amenable to prolonged suspension. These authors also provided information regarding the carbon-nitrogen character and oxygen uptake rates of this material. The protein content of Spartina detritus increased with decreasing particle size; organic carbon content (carbohydrates) decreased with decreasing particle size; and oxygen uptake increased with decreasing particle size.

Detritus originating from a 17.5-acre Spartina marsh was tidally flushed to the undeveloped canal where some of the material was undoubtedly distributed to sediments and the remaining suspended detritus exported from the system. Sediment profiles of the canal were fairly similar to the organic profile reported for the marsh (Figure 83 , Station 9A).

The entire detrital load placed on the canal apparently imposed little demand on the oxygen resources of the canal system (see DO profile for Stations 9 and 10, Figure 68). Quite likely, organic matter settling to the bottom represents the coarser, more dense detritus which would tend to be fairly well stabilized in terms of decomposition and effects on oxygen demand too low to be detected by our DO measurements. The reader will note that the C:N ratios of the sediments for any canal and non-canal stations appeared to be relatively small with respect to ratios indicated for the Florida canals (Tables XXVI thru XXVII). As discussed earlier, a C:N ratio approaching 11:1 was presumed indicative of fairly well stabilized sediment in terms of microbial decomposition.

Detritus held in suspension (predominantly the Nanno fraction), but ultimately exported from the system, would represent the maximum potential for demands on dissolved oxygen resources of the canal system. Based on DO profiles for the undeveloped canal, these demands were either easily met or the detritus was exported from the system before the demands could be reflected in the measured DO levels.

Sediment of the developed canals also reflect an organic richness (Figure 82). Vertical distribution of the organic matter, however, was fairly different from that reported for the marsh and undeveloped waterway, particularly in the case of Station 1. Cores from the dead-end location show an overall organic enrichment unequaled in magnitude by any other location samples.

Sources of carbon to developed canal systems have been identified in the septic tank leachate and mass exchange studies. With respect to the latter study, the heavily developed canal was importing tremendous quantities of organic carbon and nitrogen from areas outside of the canal system. Marsh detritus was undoubtedly a principal source of this import. As mentioned previously, detritus is divided into three size classes, with finer particles being more convenient to a prolonged suspension. As suspended particles travel the length of the canal, coarser, more dense material would be the first to settle to the bottom as indicated in the results of the sediment-particle size analyses (Appendix D-2.3). Thus, the canal constituted a trap for finely divided particles, and the organic richness of its sediments at the dead end locations would be expected. Settling rates of finely divided organic matter (Nano detritus) would be timely and a direct function of poor vertical mixing. The heavily developed canal, in the dead-end vicinity would afford a convenient area for settling of particulate matter.

Settling of finely divided organic material would not proceed without taking its toll on the canal's dissolved oxygen resource based on the work of Odum and de la Cruz (2). Figures 64 to 68 show a steady decrease in DO with depth. If sediments were the principal DO demanding agent, a different configuration for the indicated DO profile might be expected. The near linear configuration of the profiles shown would be replaced by profiles with a break in discontinuity such as is illustrated in Figure 84.

2. Metals

Metal concentrations in the sediments at Punta Gorda reveal major differences between the undeveloped and the developed canal (Figure 85). Metal concentrations (lead, manganese, zinc, and iron) in the developed canal increased from the mouth to the dead end while in the undeveloped canal, the reverse was true. This disparity leads to the suspicion that the undeveloped canal is receiving metals from the access waterway near its mouth and that the developed canal is accumulating intrinsic metals.

3. Pesticides

No significant pesticides accumulations occurred in the sediments at any of the sampling stations (Tables XXIV & XXV). A list of the complete pesticide scan and their detection are presented in Appendix D-3. Pesticide accumulation at Punta Gorda followed trends similar to those described for sediment metals. In the developed canal, accumulations increased from the mouth to the dead end; while in the undeveloped canal, the process reversed itself.

Likewise, at Panama City, sediment samples taken for pesticide analysis revealed low levels of pesticide contamination. In general, concentrations increased from the canal mouths to their dead ends.

4. Development Densities Versus Sediment Composition

Relative stages of development (dwelling unit density) along canal banks are positively correlated to sediment composition (Table XXIX). Four types of comparisons made were:

Case	
A	Canals with development versus background
B	Canals with development versus canals without development
C	Canals with development versus canals with light development
D	Canals without development versus background

A case-by-case comparison from this table qualifies the differences in sediment composition relative to stage of development. In Case A, 78 percent of the comparisons revealed higher concentrations in the developed canal than in background stations. In Case B, 83 percent of the comparisons showed higher concentrations in the developed canal than in canals with no development. In Case C, 100 percent of the comparisons revealed higher concentration in the developed canals than those which had only light development. In Case D, 59 percent of the comparisons showed that undeveloped canals had higher concentrations than background stations.

The above evidence of accumulation of chemical parameters in the benthic deposits in canal systems is replete. Not only do developed canals accumulate chemicals in the sediments, but also to a lesser extent, undeveloped canals trap chemicals from allochthonous sources into their sediments.

TABLE XXIV
AVERAGE CONCENTRATIONS IN THE SEDIMENTS
PUNTA GORDA, FLORIDA
FINGER FILL CANAL STUDY
NOVEMBER, 1973

00339 COD MUD DRY WGT MG/KG	70320 MOISTURE CONTENT PERCENT	70322 RESIDUE TOT VOL PERCENT	00626 ORGAN. N MUD D WT MG/KG-N	00668 PHOS MUD DRY WGT MG/KG-P	01052 PB MUD DRY WGT MG/KG-PB	01053 MN MUD DRY WGT MG/KG-MN	01093 ZN MUD DRY WGT MG/KG-ZN	01170 FE MUD DRY WGT MG/KG-FE	00747 SULFIDES MUD UG/KG	39368 DDE MUD UG/KG	39363 DDD MUD UG/KG	39373 DDT MUD UG/KG	39393 ENDRIN MUD UG/KG	39519 PCBS MUD UG/KG
150500	59	7.2	1850	450.0	8K	14	13	6500	981.0	0.74	0.83	ND	ND	ND
325000	80	6.7	8000	1350.0	20	30	32	14700	88.0	1.90	25.00	ND	ND	ND
368200	85	6.1	7250	1400.0	15	20	33	10100	146.0	ND	15.00	ND	ND	ND
47800	24	2.8	600	760.0	8K	4K	1K	310	16.0	ND	ND	ND	ND	ND
154300	66	8.8	3500	850.0	20	27	33	10250	530.0	1.40	3.70	ND	ND	ND
140400	61	9.1	3100	1000.0	29	27	44	12100	251.0	0.75	3.50	ND	ND	ND
44100	40	6.6	1300	800.0	8K	11	9	3500	484.0	0.35	1.50	ND	ND	ND
19000	55	8.5	2000	960.0	26	23	22	3200	1244.0	ND	ND	ND	ND	ND
62400	49	8.2	1750	850.0	20	24	22	8400	723.0	1.50	0.83	ND	ND	ND
41000	52	8.1	1450	410.0	17	19	14	7400	421.0	0.36	1.30	ND	ND	ND
20500	29	7.0	1050	20000.0	8K	12	8	2980	65.0	ND	0.53	ND	3.60	ND
138000	64	8.2	2650	2250.0	40	35	44	11550	2026.0	ND	1.60	ND	1.90	ND

AVERAGE CONCENTRATIONS IN THE SEDIMENTS
BIG PINE KEY, FLORIDA
FINGER FILL CANAL STUDY
NOVEMBER, 1973

00339 COD MUD DRY WGT MG/KG	70320 MOISTURE CONTENT PERCENT	70322 RESIDUE TOT VOL PERCENT	00626 ORGAN. N MUD D WT MG/KG-N	00668 PHOS MUD DRY WGT MG/KG-P	01052 PB MUD DRY WGT MG/KG-PB	01053 MN MUD DRY WGT MG/KG-MN	01093 ZN MUD DRY WGT MG/KG-ZN	01170 FE MUD DRY WGT MG/KG-FE	00747 SULFIDES MUD UG/KG	39368 DDE MUD UG/KG	39363 DDD MUD UG/KG	39373 DDT MUD UG/KG	39393 ENDRIN MUD UG/KG	39519 PCBS MUD UG/KG
38600	45	5.1	1250	90.	15	5	4	450	20.0K	ND	ND	ND	ND	ND
55100	54	4.5	1650	135.	13	5	5	450	32.0	ND	ND	ND	ND	ND
33000	51	5.7	1800	125.	18	9	5	975	43.0	ND	ND	ND	ND	ND
76700	61	6.3	2050	160.	35	15	14	1100	175.0	ND	ND	ND	0.94	ND
50000	53	4.7	1600	155.	19	4K	11	500	42.0	ND	ND	ND	3.50	ND
86600	71	4.3	2100	145.	18	5	14	730	52.0	ND	ND	ND	0.64	ND
120000	74	5.0	3550	185.	28	10	29	1150	108.0	0.72	0.84	1.0	ND	1.2
73800	62	5.4	2000	175.	18	4K	15	360	27.0K	ND	ND	ND	0.91	ND
67400	[illegible]	4.5	1750	245.	22	6	14	892	18.0	1.90	5.30	ND	ND	ND
38500	51	5.1	1450	130.	21	19	14	460	22.0	ND	ND	ND	ND	ND
73800	64	5.1	1900	200.	22	16	10	1800	25.0	ND	ND	ND	ND	ND

TABLE XXV

AVERAGE CONCENTRATIONS IN THE SEDIMENTS
PANAMA CITY, FLORIDA
FINGER FILL CANAL STUDY
SEPTEMBER, 1974

STATION	00339 COD MUD DRY WGT MG/KG	00495 % MOIST. SEDIMENT SAMPLE	70322 RESIDUE TOT VOL PERCENT	00626 ORGAN. N MUD D WT MG/KG-N	00668 PHOS MUD DRY WGT MG/KG-P	01053 MN MUD DRY WGT MG/KG-MN	01093 ZN MUD DRY WGT MG/KG-ZN	01170 FE MUD DRY WGT MG/KG-FE	00626 TKN MUD MG/KG	01029 CR MUD MG/KG	01043 CU MUD MG/KG	00693 C:N MUD MG/KG	39368 DDE MUD UG/KG	39363 DDD MUD UG/KG	39373 DDT MUD UG/KG	39519 PCBS MUD UG/KG
PC-A	464100	62.00	12.2	6450	257	10	30	3400	6450	15	11	10:1	49.00	290.00	ND	22.0
PC-B	462000	83.00	24.1	8850	202	6	34	4200	8850	12	7	20:1	7.00	78.00	ND	11.0
PC-C	10180	30.00	1.1	1920	13	2	3	48	1920	8K	1	2:1	4.80	24.0	6.1	ND
PC-G	380700	74.00	20.8	9250	580	17	43	15200	9250	27	8	15:1	22.00	100.00	ND	ND
PC-H	247600	62.00	13.6	7350	260	13	28	8000	7350	20	11	13:1	11.00	49.00	ND	ND
PC-I	469400	84.00	24.2	10200	231	17	27	12800	10200	21	11	17:1	20.0	95.00	ND	12.0
PC-J	1885	19.00	5.5	67	41				119			11:1				

AVERAGE CONCENTRATIONS IN THE SEDIMENTS
ATLANTIC BEACH, NORTH CAROLINA
FINGER FILL CANAL STUDY
SEPTEMBER, 1974

STATION	00339 COD MUD DRY WGT MG/KG	00495 % MOIST. SEDIMENT SAMPLE	70322 RESIDUE TOT VOL PERCENT	00626 ORGAN. N MUD D WT MG/KG-N	00668 PHOS MUD DRY WGT MG/KG-P	01053 MN MUD DRY WGT MG/KG-MN	01093 ZN MUD DRY WGT MG/KG-ZN	01170 FE MUD DRY WGT MG/KG-FE	00747 SULFIDES MUD UG/KG	00693 C:N MUD MG/KG
AB-01	151000	86.00	17.8			134	174	27000	1957	
AB-02	11500	28.00	1.8	375	120	12	8	2060	32	11:1
AB-03	96300	60.00	8.0	1420	415	78	52	15000	320	25:1
AB-04	10700	22.00	0.8	350	145	12	6	2060	367	11:1
AB-05	54000	85.00	16.5	2850	430	112	82	21200	640	7:1
AB-06	183900	84.00	18.7	3180	450	125	108	24200	100	22:1
AB-08	12700	27.00	2.1	400	250	265	11	41800	40	12:1
AB-09	177000	97.00	17.1	2780	550	124	90	24000		2:1
AB-10	41000	58.00	3.6	1120	335	44	25	9000	305	14:1

AVERAGE CONCENTRATIONS IN THE SEDIMENTS
SPOONER'S CREEK, NORTH CAROLINA
FINGER FILL CANAL STUDY
SEPTEMBER, 1974

STATION	00339 COD MUD DRY WGT MG/KG	00495 % MOIST. SEDIMENT SAMPLE	70322 RESIDUE TOT VOL PERCENT	00626 ORGAN. N MUD D WT MG/KG-N	00668 PHOS MUD DRY WGT MG/KG-P	01053 MN MUD DRY WGT MG/KG-MN	01093 ZN MUD DRY WGT MG/KG-ZN	01170 FE MUD DRY WGT MG/KG-FE	00747 SULFIDES MUD UG/KG	00693 C:N MUD MG/KG
SC-01	204000	82.00	25.0	4900	375	136	66	27600	844	16:1
SC-03	135000	59.00	11.1	2450	350	152	68	20600	222	21:1
SC-04	39000	48.00	4.5	1120	290	64	43	9800	546	13:1
SC-05	2874	21.00	4.6	425	305	7	4	860	48	3:1

Table XXVI

Concentration of organic carbon and nitrogen, and carbon-to-nitrogen ratios found in the top 10 cm of bottom sediments, Punta Gorda and Big Pine Key areas, November 1973.

Punta Gorda				Big Pine Key			
Station	Conc. Organic Carbon* (mg/kg)	Conc. Organic Nitrogen (mg/kg)	C:N Ratio	Station	Conc. Organic Carbon* (mg/kg)	Conc. Organic Nitrogen (mg/kg)	C:N Ratio
1 (DE)	56,367	1,850	30:1	8 (DE)	14,457	1,250	12:1
2 (M)	121,723	8,000	15:1	9 (M)	20,637	1,650	12:1
3 (MO)	137,790	7,250	19:1	10 (MO)	12,360	1,800	7:1
4 (BG)	17,903	600	30:1	11 (BG)	28,727	2,050	14:1
5 (DE)	57,790	3,500	16:1	12 (DE)	18,727	1,600	12:1
6 (M)	52,584	3,100	17:1	13 (M)	32,434	2,000	16:1
7 (MO)	16,516	1,300	13:1	14 (MO)	44,944	3,500	13:1
				G (S)	25,243	1,750	14:1

* Values based on conversion of COD to organic carbon.

DE - deadend, M - mid, MO - mouth, BG - background, S - special.

Table XXVII. Concentration of organic carbon and nitrogen and carbon to nitrogen ratios found in the top 30 cm of bottom sediments at Sea-Air Estate canal, Marathon, Florida, August 1974.

Station	Organic Carbon (mg/kg)	Organic Nitrogen (mg/kg)	C:N Ratio
15	19,546	1,650	12:1
16	26,466	1,560	17:1
17	17,151	1,475	12:1
18	23,158	1,875	12:1
19	28,864	2,375	12:1

Table XXVIII. Concentration of organic carbon and nitrogen and carbon to nitrogen ratios found in the top 10 cm of bottom sediments at Atlantic Beach and Spooners Creek, North Carolina, September 1974.

Atlantic Beach			
Station	Organic Carbon (mg/kg)	Organic Nitrogen (mg/kg)	C:N Ratio
1	56,554	NS	--
2	4,307	375	11:1
3	36,067	1,420	25:1
4	4,007	350	11:1
5	20,225	2,850	7:1
6	68,876	3,180	22.1
7	NS	NS	--
8	4,756	400	12:1
9	6,629	2,780	2:1
10	15,355	1,120	13.7

Spooners Creek			
Station	Organic Carbon (mg/kg)	Organic Nitrogen (mg/kg)	C:N Ratio
1	78,277	4,900	16:1
2	NS	NS	--
3	50,561	2,450	21:1
4	12,735	1,120	11.4
5	1,075	425	3:1

Table XXIX. Sediment comparisons by degree of development, Finger-Fill Canal Study.

Parameter	Punta Gorda			Big Pine Key			Atlantic Beach				Spooners Creek	Panama City (Woodlawn)	Panama City (Hentz)
	D vs UD	D vs BG	UD vs BG	D vs UD	D vs BG	UD vs BG	D vs UD	D vs LD	D vs BG	UD vs BG	D vs BG	D vs BG	D vs BG
COD	D*	D	UD	D	D	UD	D	D	D	UD	D	D	D
VSS	D	D	UD	Same	Same	BG	Same	D	D	UD	D	D	D
Org-N	D	D	UD	D	Same	BG	--	--	--	UD	D	D	D
Phosphate	D	D	BG	D	D	BG	--	--	--	UD	D	D	D
Pb	D	D	UD	D	D	BG	D	D	D	UD	D	--	--
Mn	D	D	UD	Same	Same	BG	D	D	BG	BG	D	--	--
Zn	D	D	UD	D	D	BG	D	D	D	UD	D	--	--
Fe	D	D	UD	D	BG	BG	D	D	D	UD	D	--	--
Sulfide	UD	D	UD	D	BG	BG	--	D	D	--	D	--	--
C:N	UD	BG	Same	Same	D	UD	--	--	--	BG	D	BG	D

D - Canal with development along its banks.
UD - Canal with no development along its banks.
BG - Background
LD - Canal with light development along its banks.

*Denotes higher concentration in developed site.

FIGURE 77
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS)
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

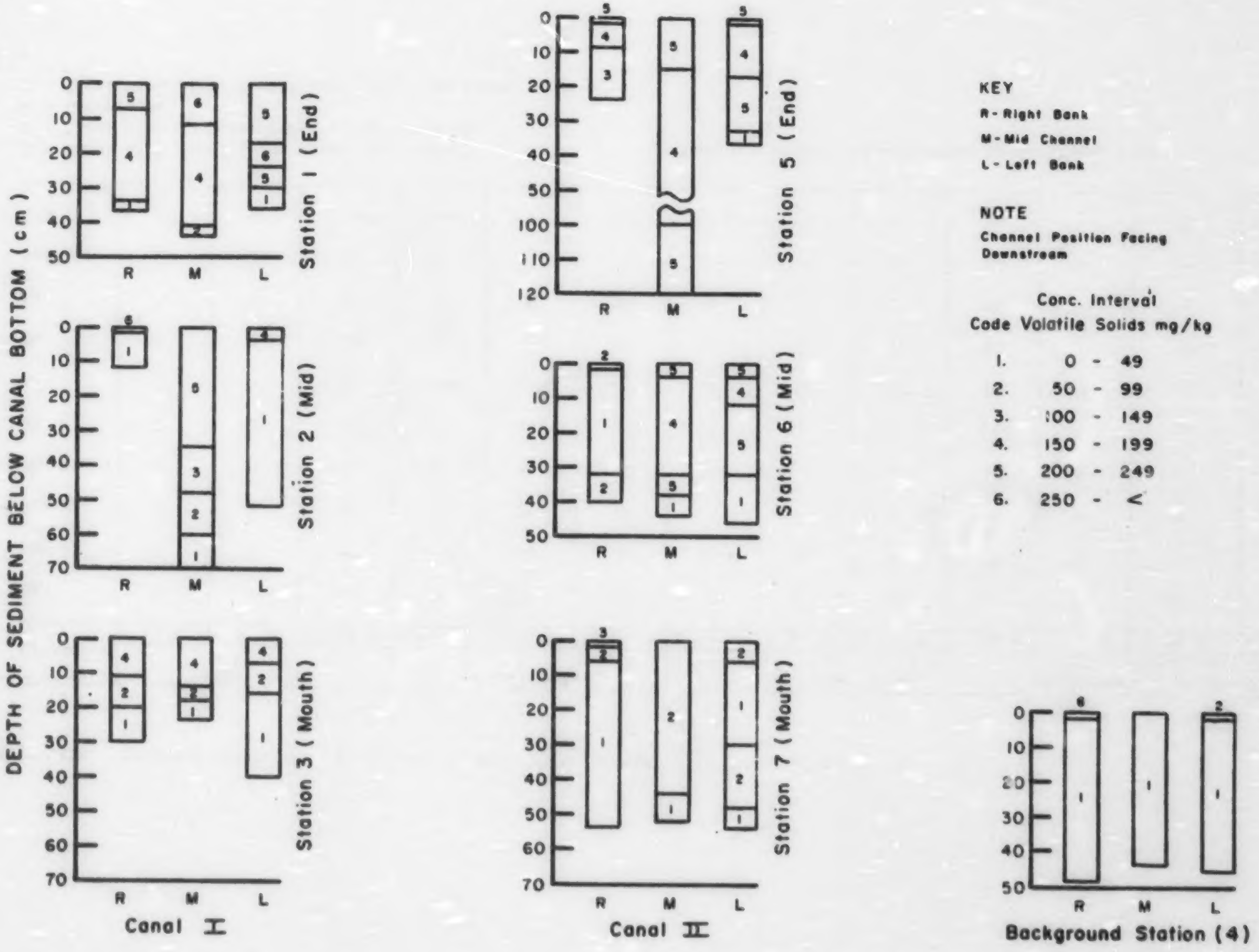


FIGURE 78
VERTICAL AND LONGITUDINAL DISTRIBUTION
OF ORGANIC MATTER (VOLATILE SOLIDS)
SPECIAL STATIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

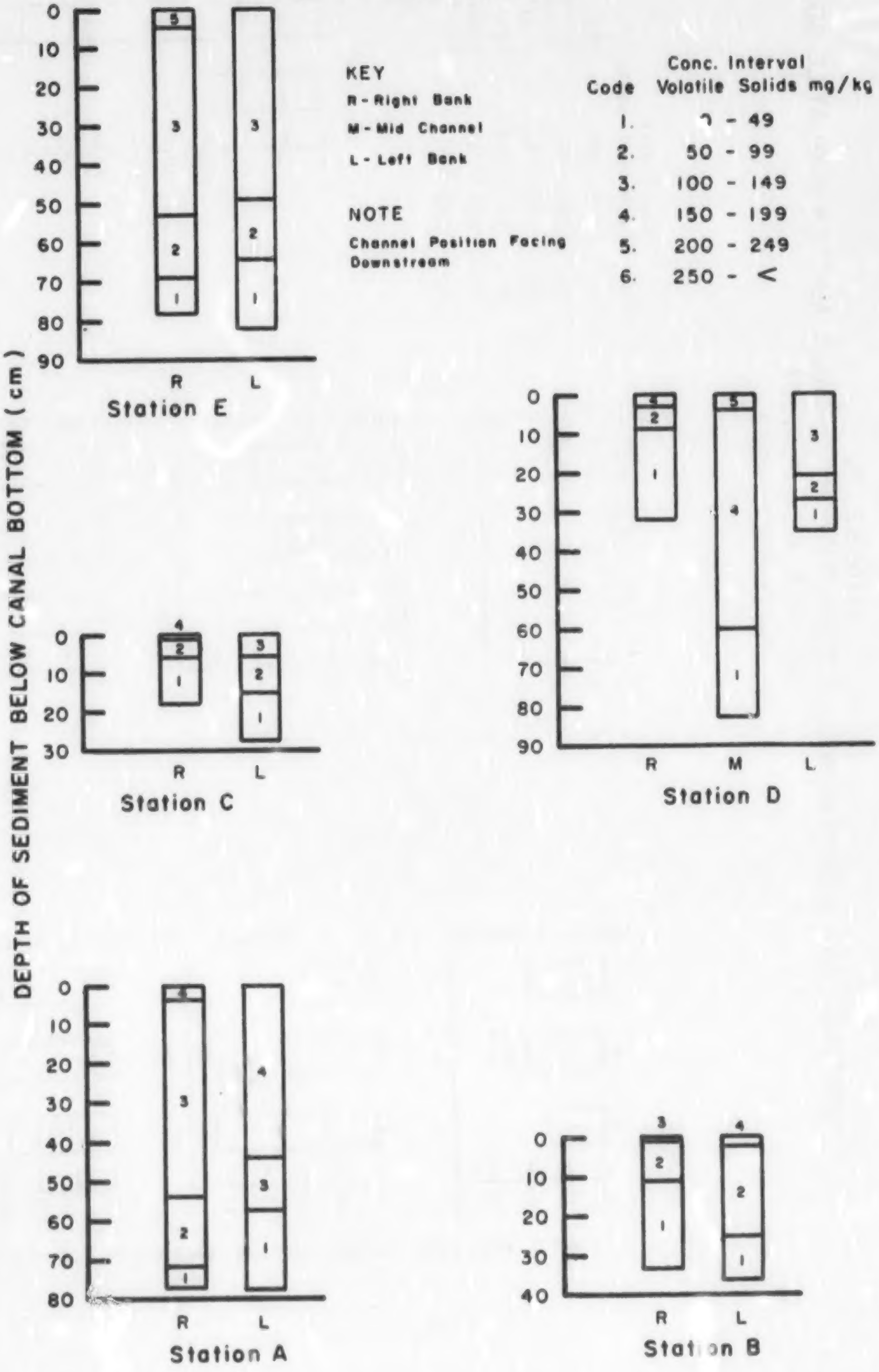


FIGURE 79
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS)
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

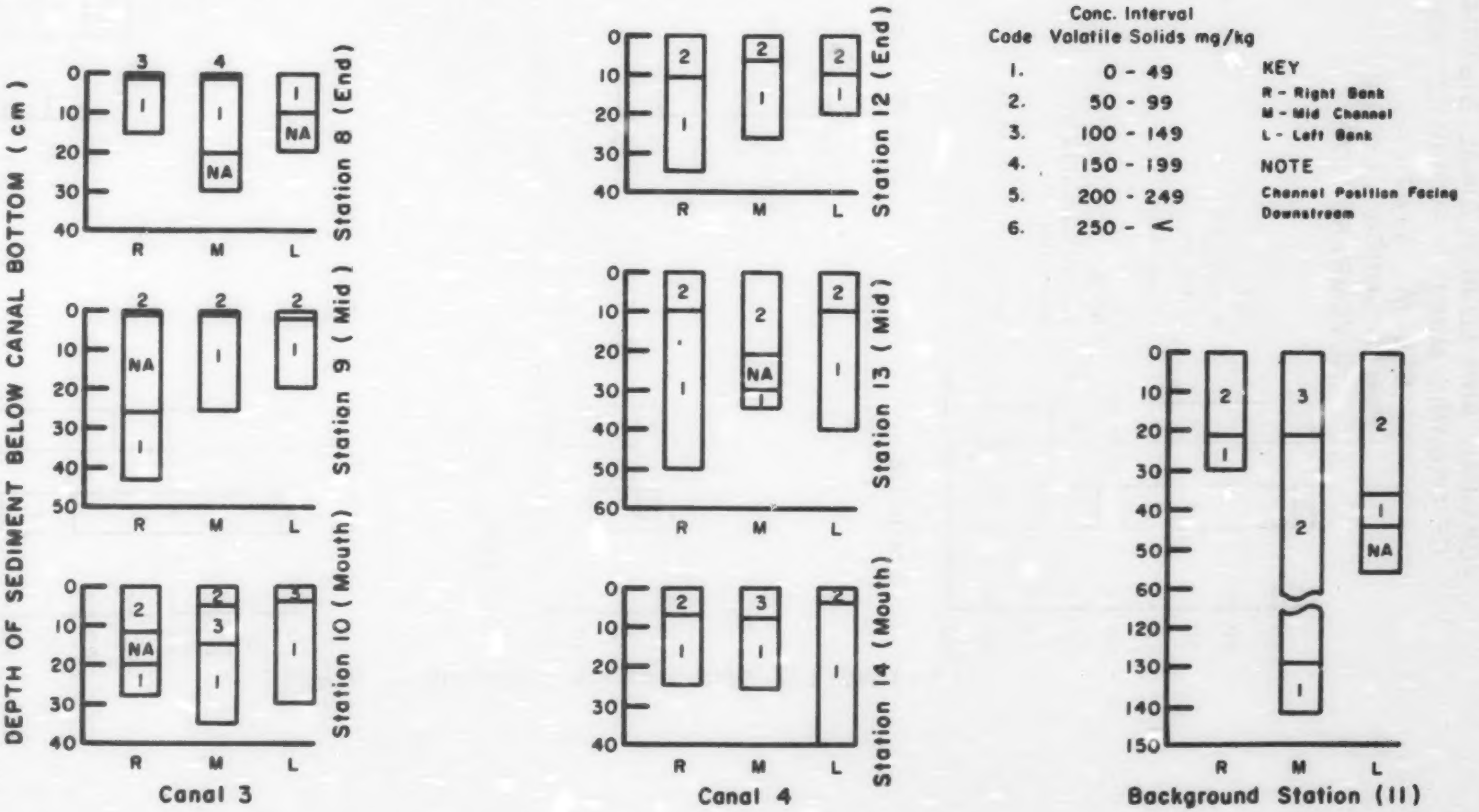


FIGURE 80
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS) SPECIAL STATIONS BIG PINE KEY, FLORIDA NOVEMBER, 1973

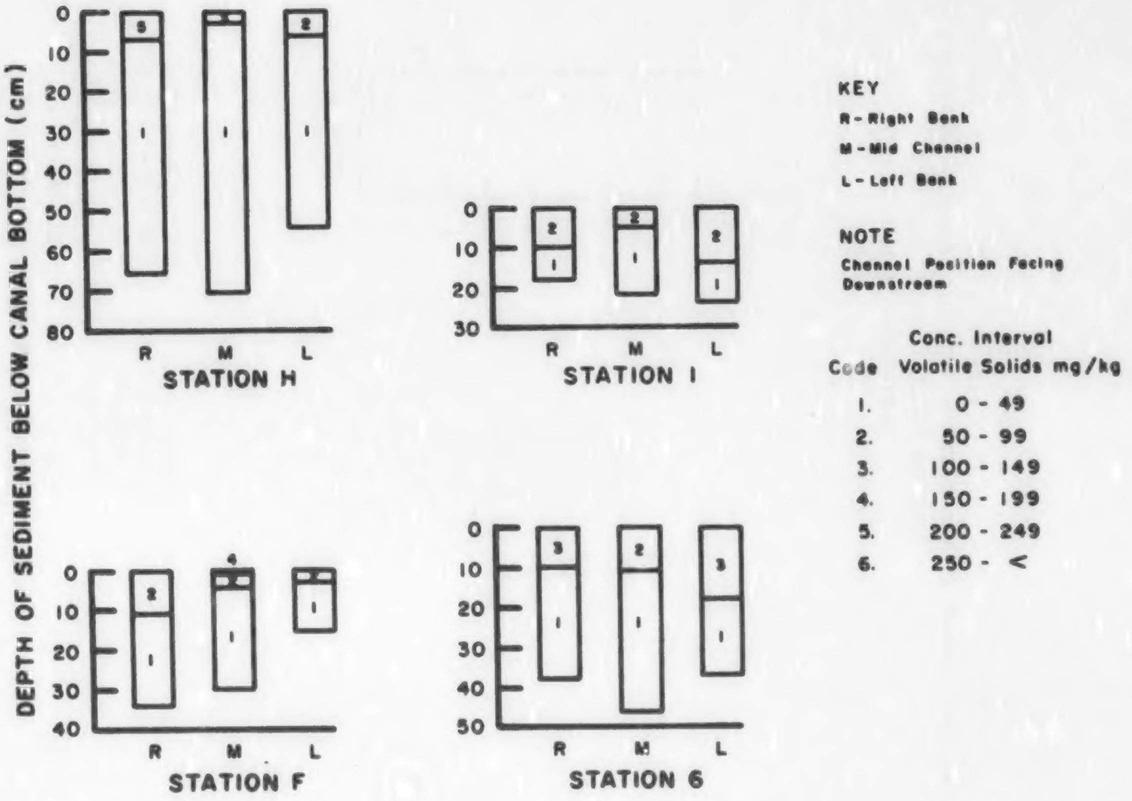
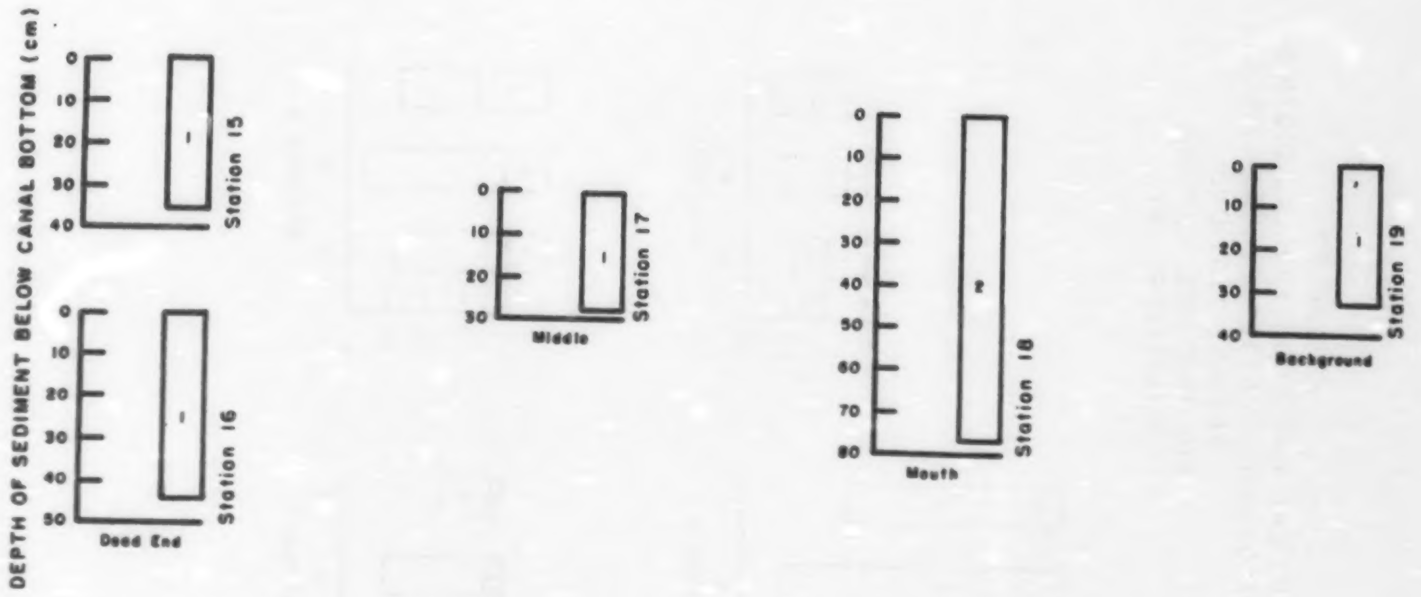


FIGURE 81
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS)
SEA AIR ESTATES, MARATHON, FLA.
SEPTEMBER, 1974



KEY
R - Right Bank
M - Mid Channel
L - Left Bank

NOTE
Channel Position Facing Downstream

Code	Conc. Interval Volatile Solids mg/kg
1.	0 - 49
2.	50 - 99
3.	100 - 149
4.	150 - 199
5.	200 - 249
6.	250 -

FIGURE 82
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS)
ATLANTIC BEACH, N.C.
SEPTEMBER, 1974

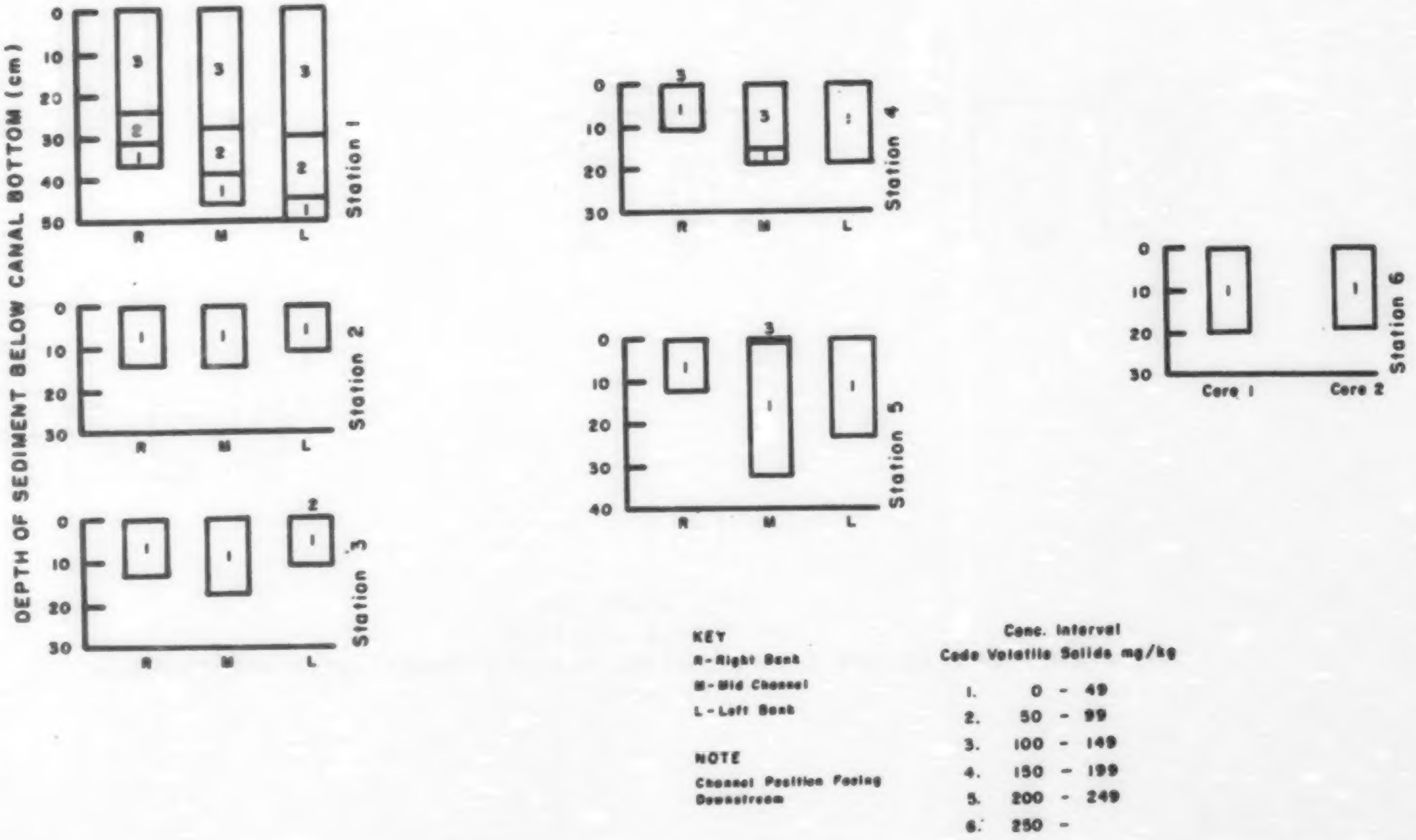


FIGURE 83
VERTICAL AND LONGITUDINAL DISTRIBUTION OF ORGANIC MATTER (VOLATILE SOLIDS)
ATLANTIC BEACH, N.C.
SEPTEMBER, 1974

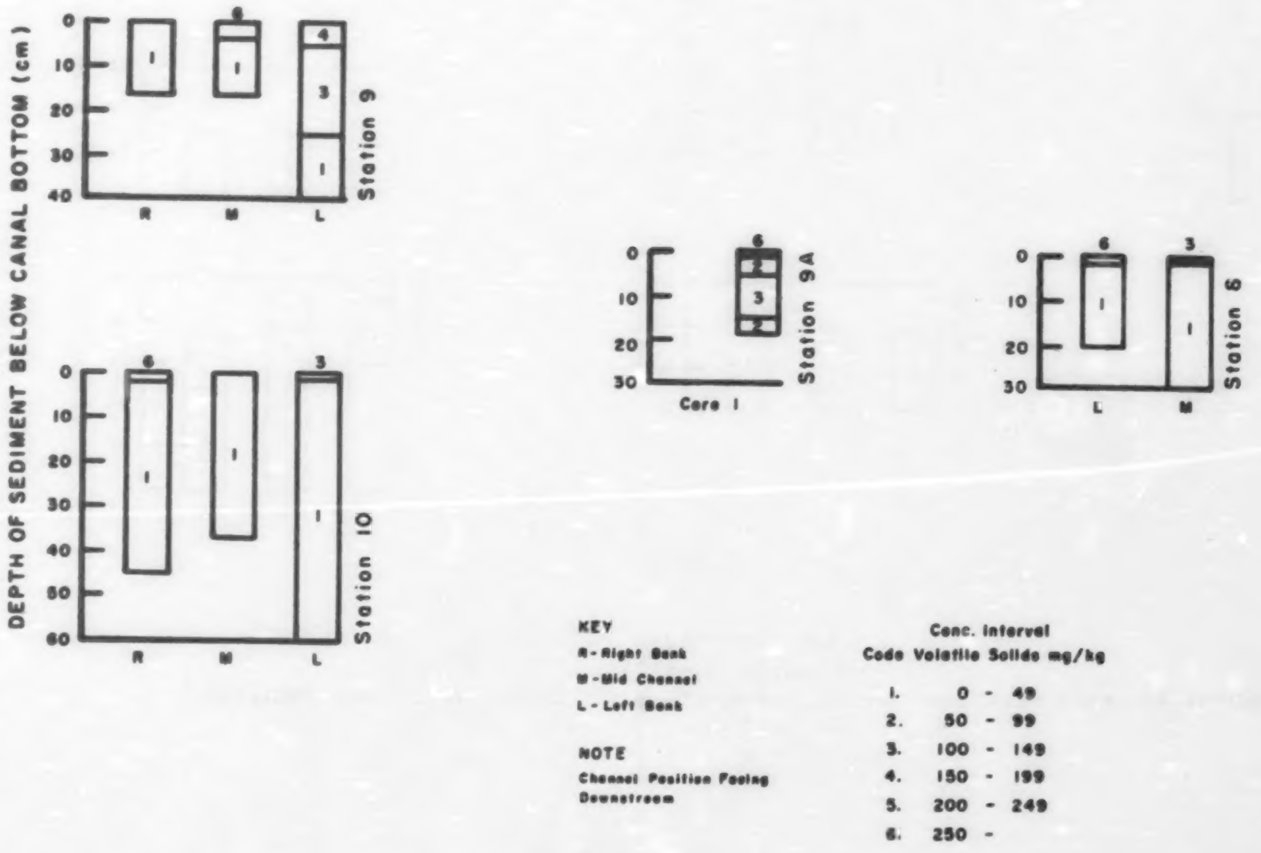


FIGURE 84

HYPOTHESIZED DISSOLVED OXYGEN PROFILE WITH DEPTH ASSUMING NO VERTICAL SALINITY OR TEMPERATURE STRATIFICATION AND BENTHIC RESPIRATION AS PRINCIPAL OXYGEN CONSUMER

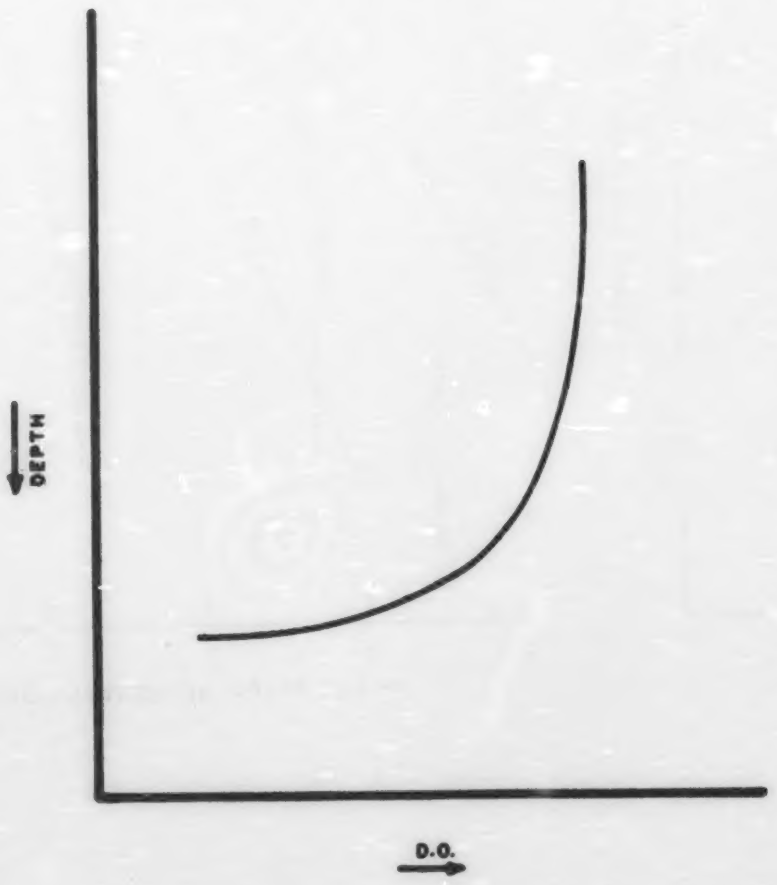
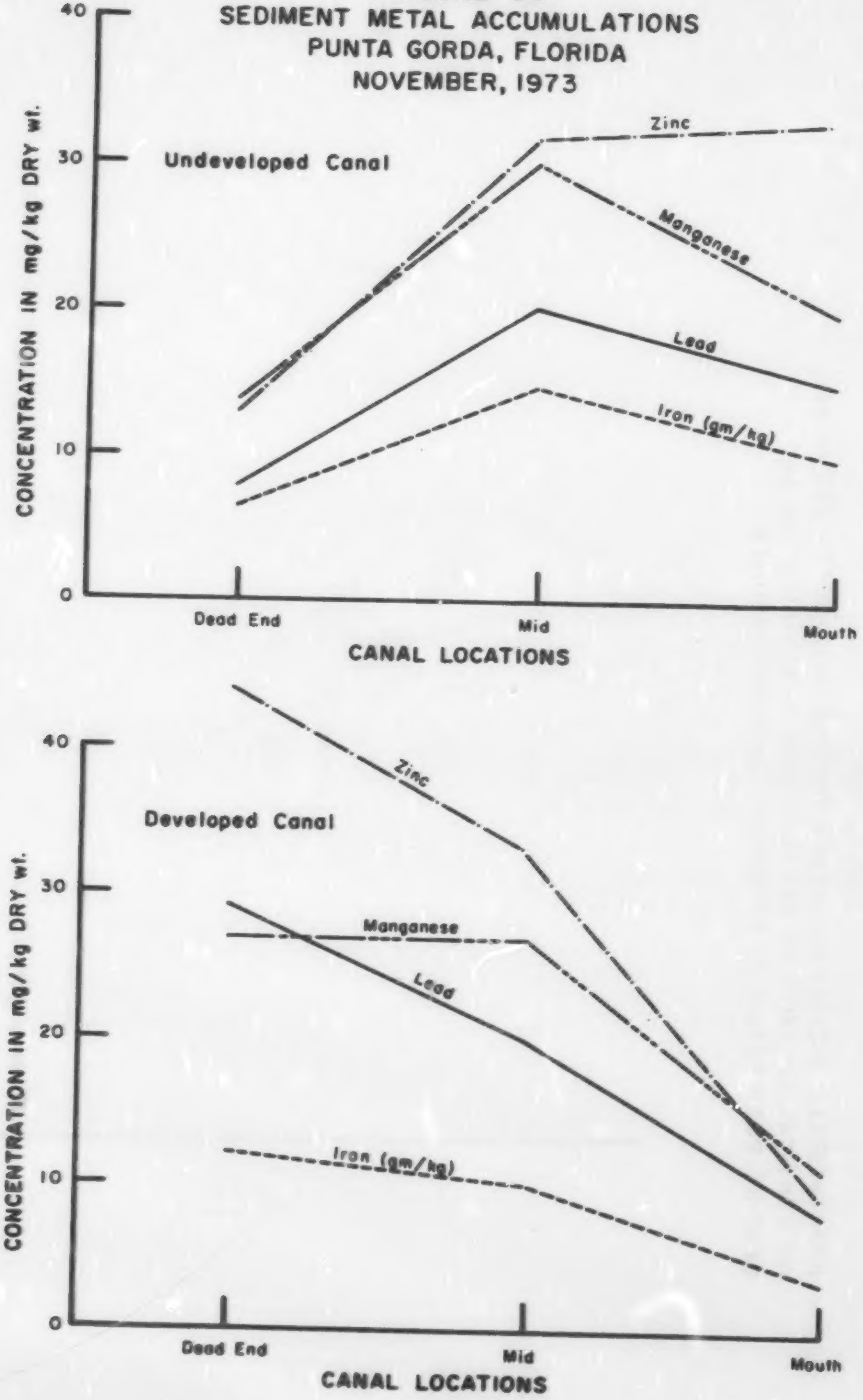


FIGURE 85
SEDIMENT METAL ACCUMULATIONS
PUNTA GORDA, FLORIDA
NOVEMBER, 1973



E. SEPTIC TANK LEACHATE TRACING STUDIES

Septic tank systems potentially serve as a source of bacterial, viral, and chemical contamination to surface and subsurface waters. The same concerns can also be extended to central sewage treatment systems should they be inadequately designed, maintained, or operated. If the groundwater in the vicinity of septic tank systems serves as water supply, public health problems of paramount proportion could exist. In the case of tidal canals, the public health issue remains germane in view of the potential transfer of the septic tank effluent to the waterway. A secondary concern focuses on the nutrient enrichment aspects by the leachates and the potential for creating a biotic imbalance in the waterway and adjoining estuarine waters. A cursory review of literature relating to the influence of septic tank leachates on public health and environmental quality is presented in Section F of this report.

Septic tank leachate tracing studies were initiated at Punta Gorda and Big Pine Key, Florida, and at Atlantic Beach, North Carolina, to document movement of septic tank leachates into canal waters.

A conservative dye (Rhodamine WT) was introduced into selected septic tank systems at the Florida and North Carolina locations (Figures 86, 87 and 88). In each case, four liters of 20% Rhodamine WT dye were introduced through a house drain into the septic tank system. An automatic sampler was placed at the edge of the canal and programmed to sample at hourly intervals. The intake of the sampler was placed approximately one foot from the bottom of the canal and at a point immediately down gradient from the septic tank/drainfield system. Samples were analyzed for the presence of dye with a microflourometer.

At Punta Gorda, the presence of dye in the canal system was clearly confirmed after 25 hours (Figure 89). In the Atlantic Beach study, confirmation came after an elasped time of 60 hours in one test and only 4 hours in a second experiment (Figures 90 and 91, respectively).

Although the two study areas were geographically remote to one another, the septic tank and drainfields shared some common features. In both cases the tanks were approximately 50 feet from the canal. The drainfield tiles were parallel to the canal which was partially bulkheaded. The land elevation was approximately five feet above mean high water, and the building sites were created from fill material derived from the excavation of the canals. The seepage fields are composed primarily of sand, silt, and shell. The tidal dynamics of the two regions were fairly similar. Two to three foot tidal ranges are common at both locations.

The hydraulic head between the canal water surface and the invert elevation of the draintile provided the necessary gradient for the transfer of the septic tank effluent to the canal system and the effluent appeared to follow a noninterrupted course to the waterway.

Factors affecting the disposition of the effluent were undoubtedly the drainfield construction and the water-use pattern of the occupants. These aspects are partly evident in the tracing experiment at Site B in Atlantic Beach. Reviewing Figure 91 , the first dye injection was made at approximately 1400 hours and a response in the canal recorded 4 hours following. Also, in Figures 89 and 90 of tracing at Punta Gorda and Atlantic Beach, respectively, the peaks follow patterns indicative of wastewater discharge flow fluctuations.

In the Big Pine Key study, dye was introduced into two septic tank systems located on two different canals. No evidence of dye was detected in either waterway over a period of 110 to 150 hours of sampling.

Three factors could have been responsible for the absence of dye at the point of our sampling:

- o Sorption of dye with the drainfield substrate.
- o Lack of sufficient hydraulic gradient between the draintile invert and the canal waters.
- o Direction of travel different from point of sampling.

The principle soil substrate of the Big Pine Key area is Oolite, a carbonate of lime. The material is extremely porous and has a strong tendency to chemically bind with other compounds. To determine the scavenging effect of the Oolite on the dye, sorption experiments were conducted in the laboratory with the two materials. Various concentrations of dye were simply exposed to Oolite packed in plastic columns and the residue of dye remaining in solution was measured over increasing time intervals (in excess of five days). The dye showed no measurable affinity for the carbonate material.

At Doctors Arm Subdivision, building sites were created from fill material obtained in the excavation of the canals. The fill was mainly fractured Oolite. The unconsolidated aggregate remained extremely porous when compacted as indicated by percolation test data (two minutes per inch).

During the time of the dye tracing studies, the recorded mean tidal elevation of the canal water was approximately 2 feet below the surface of the building sites. This feature considered in the context of the percolation data would indicate that groundwater was undoubtedly continuous with the canal. Thus, the positioning of the draintile at a soil depth of about 2 feet would place the system in direct contact with the groundwater (local residents confirmed that draintiles are often laid in water-saturated substrate). This aspect alone constitutes a direct and major contradiction to standard engineering practices relative to septic tanks. Secondly, the system periodically hydraulically fails because of the absence of gradient. In addition, chemical, bacterial and viral contaminants can move directly into the surrounding groundwater. In effect, the septic tank effluent pools in the vicinity of the drainfield and remains so until an adequate hydraulic head is established.

As already indicated, the hydraulic gradient is mainly controlled by surface water elevation in the canals. This elevation, in turn, is a product of natural tidal amplitude and wind-driven effects. At the time of these studies, tidal ranges were about one foot in elevation which is normal for this season. Apparently in the time frame of the study, the observed tidal variations were insufficient to effect a hydraulic gradient that would flush the dye from the seepage field and laterally disperse it to the canal where samplers were located. This does not exclude the possibility that the dye emerged at some other point in the canal system, a viable alternative in view of the gemorphic nature of the substrate. Under either consideration, the septic tank effluent must ultimately disperse to the open waters of the canal.

The Environmental Protection Agency in conjunction with the North Carolina Department of Natural and Economic Resources and Human Resources has begun a study of septic tank systems and associated groundwater and surface water quality at Surf City, North Carolina. To date, only a minimum quantity of data has been analyzed; however, the preliminary data are useful to this current report as pollutional trends are evident.

Four groundwater well-point systems (A thru D) were installed in this area (Figures 92 and 93). Data collected at these wells in February 1975 (Table XXX) indicate that groundwater concentrations of total Kjeldahl Nitrogen (TKN) are very responsive to proximity of septic tank systems. Well-point systems A and B both reveal considerable differences in TKN values between well samples upgradient and downgradient from septic tank systems, i.e., a 4.6 fold increase at Site B. Likewise, samples taken from single well-points located downgradient from septic tank systems at well sites C and D had TKN concentrations of 58.0 and 25.0 mg/l, respectively. These two wells (12 and 13) are located only 30 feet from the canal waters.

Leachate tracing studies (July 1975) at these Surf City, NC sites have conclusively proven that fecal coliform bacteria from septic tank systems were transmitted to canal waters. Leachates entering the canal systems as traced with dye were found to have fecal coliform densities in excess of 2,400,000 colonies per 100 milliliter.

TABLE XXX
GROUND WATER WELLS
SURF CITY, NC
FEBRUARY 20, 1975

Well System	Well No.	TKN Mg/1	Septic Tanks Located up Gradient	Distance from Well to Canal	Piezometric Water Level	Ground Water Gradient
A	3	7.3	No	420 feet	+ 4.05	0.96 ft/100 ft
A	11	13.0	Yes	220	+ 2.12	1.92 ft/100 ft
A	7	11.5	Yes	20	+ 0.55	2.72 ft/100 ft
A	Canal	-	Yes	-	0	
B	6	3.6	No	310 feet	+ 2.21	0.56 ft/100 ft
B	9	19.5	Yes	10	+ 0.53	5.30 ft/100 ft
B	Canal	-	Yes	-	0	
C	12	58.0	Yes	30 feet	+ 1.61	5.37 ft/100 ft
C	Canal	-	Yes	-	0	
D	13	25.0	Yes	30 feet	+ 1.79	5.97 ft/100 ft
D	Canal	-	Yes	-	0	

FIGURE 86
TRACER STUDY
PUNTA GORDA, FLORIDA
AUGUST, 1974

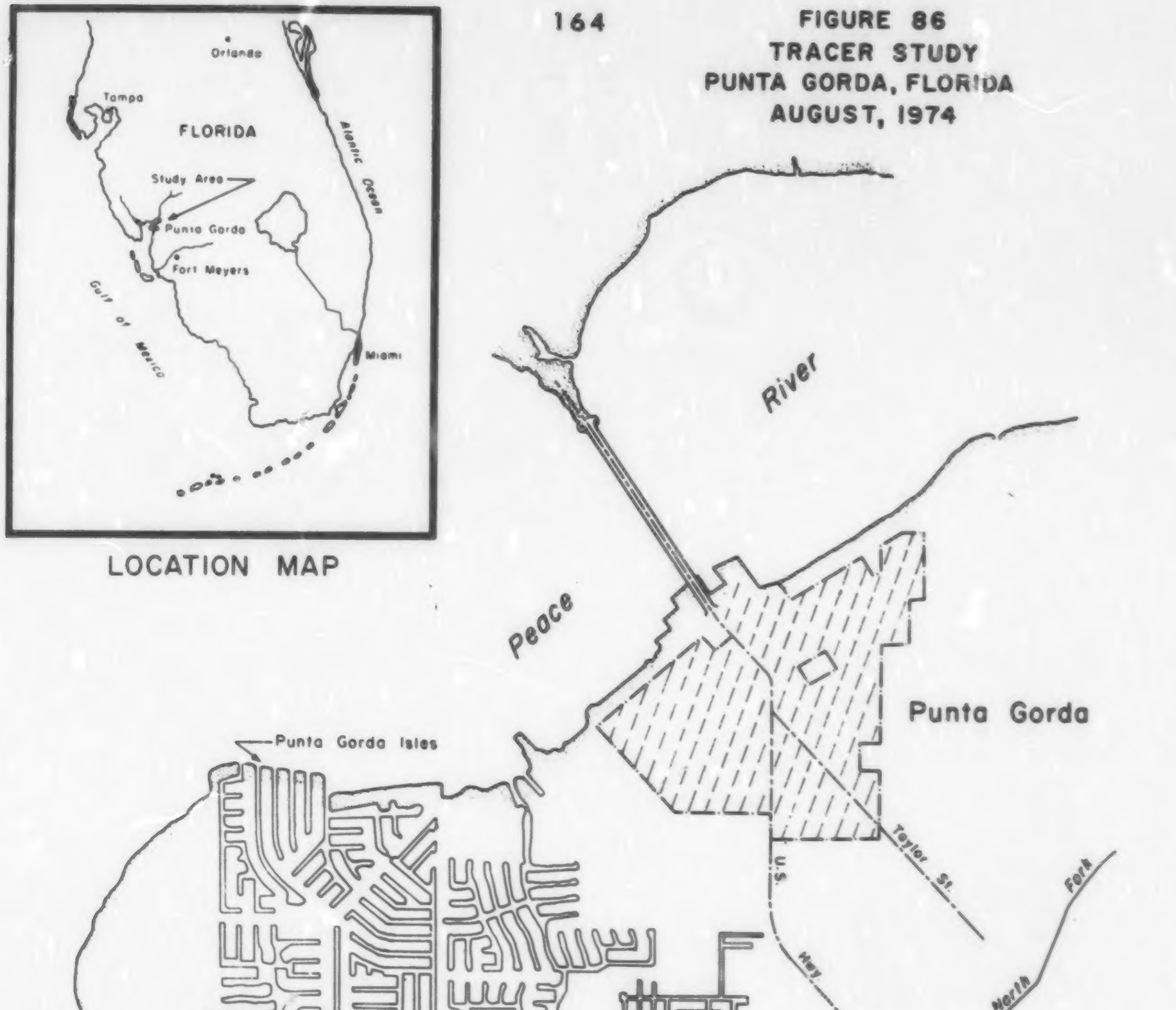

Orlando
Tampa
FLORIDA
Atlantic Ocean
Study Area
Punta Gorda
Fort Meyers
Gulf of Mexico
Miami
LOCATION MAP
Peace
River
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy 41
North Fork
Charlotte Park
Aqui Esta
Windmill Village
Tracing Study
N
Mangrove Swamp
Charlotte
Harbor
Alligator
Cr.
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 87
TRACER STUDY
BIG PINE KEY
AUGUST, 1974

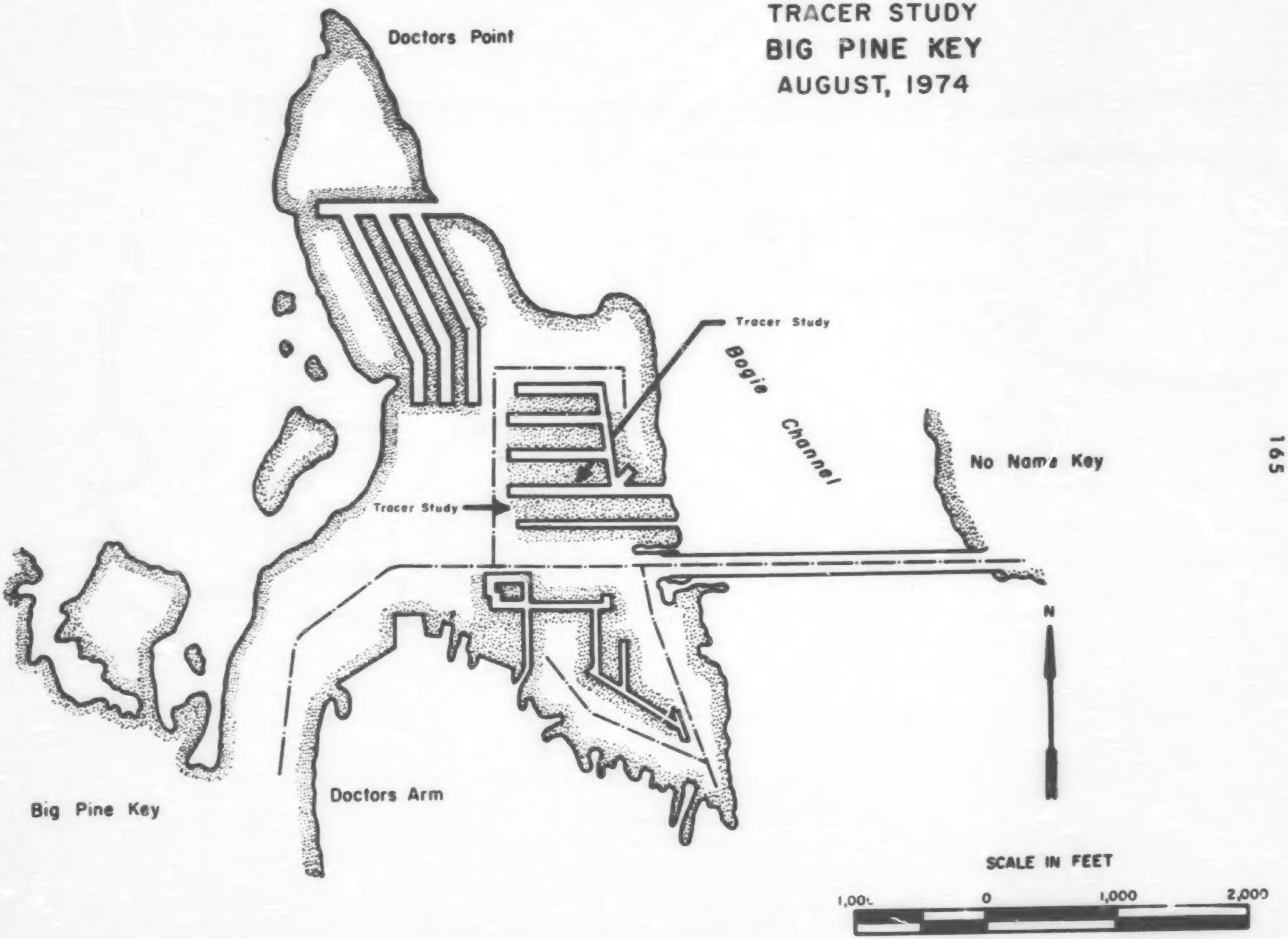

Doctors Point
Tracer Study
Bogie Channel
No Name Key
Tracer Study
N
Big Pine Key
Doctors Arm
SCALE IN FEET
1,000
0
1,000
2,000

FIGURE 88
TRACER STUDY
ATLANTIC BEACH
SEPTEMBER, 1974

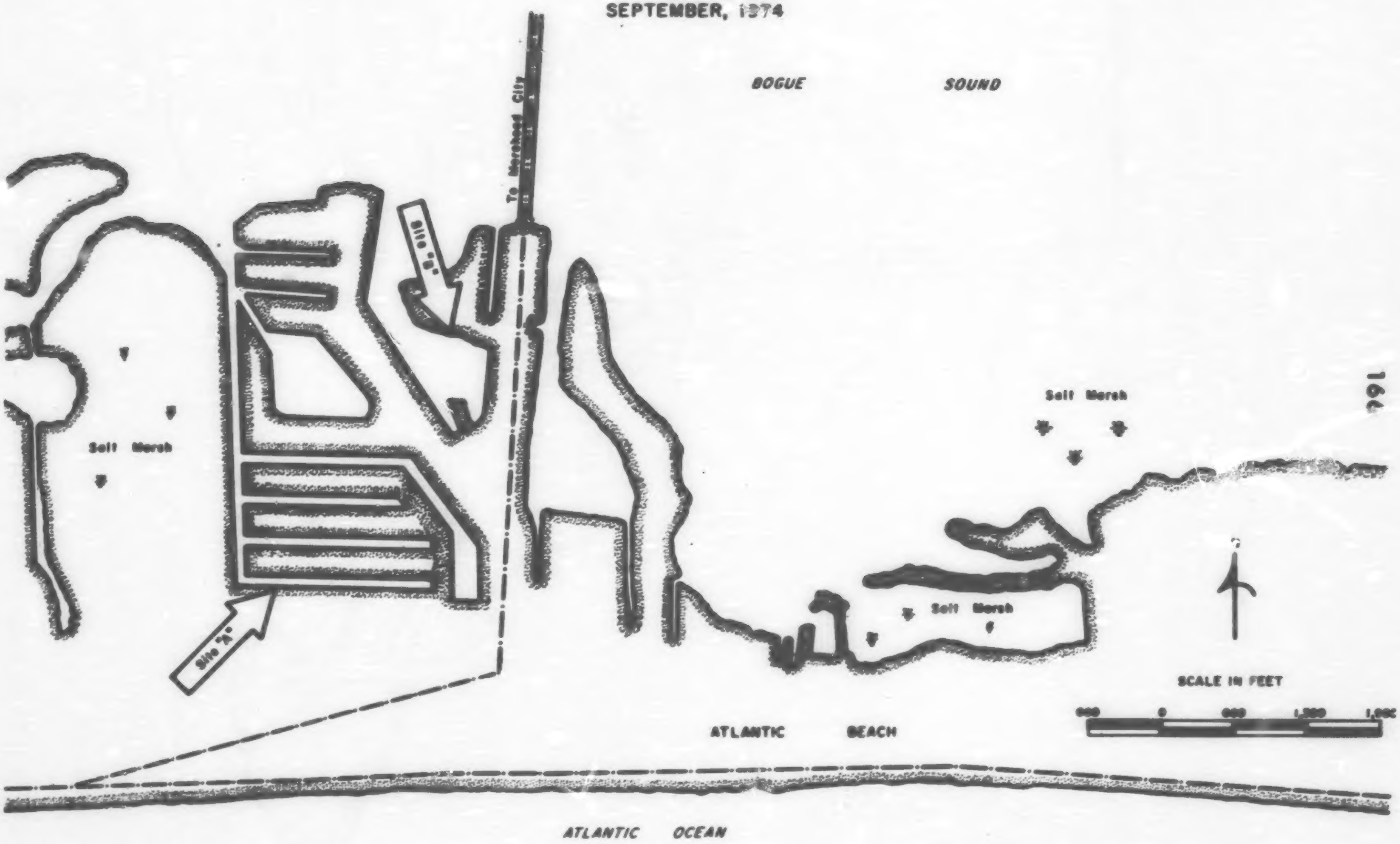

To Morehead City
BOGUE SOUND
Site "B"
Site "A"
Salt Marsh
Salt Marsh
Salt Marsh
N
SCALE IN FEET
0
ATLANTIC BEACH
ATLANTIC OCEAN

FIGURE 89
LEACHATE TRACING STUDY
PUNTA GORDA, FLORIDA
AUGUST 1974

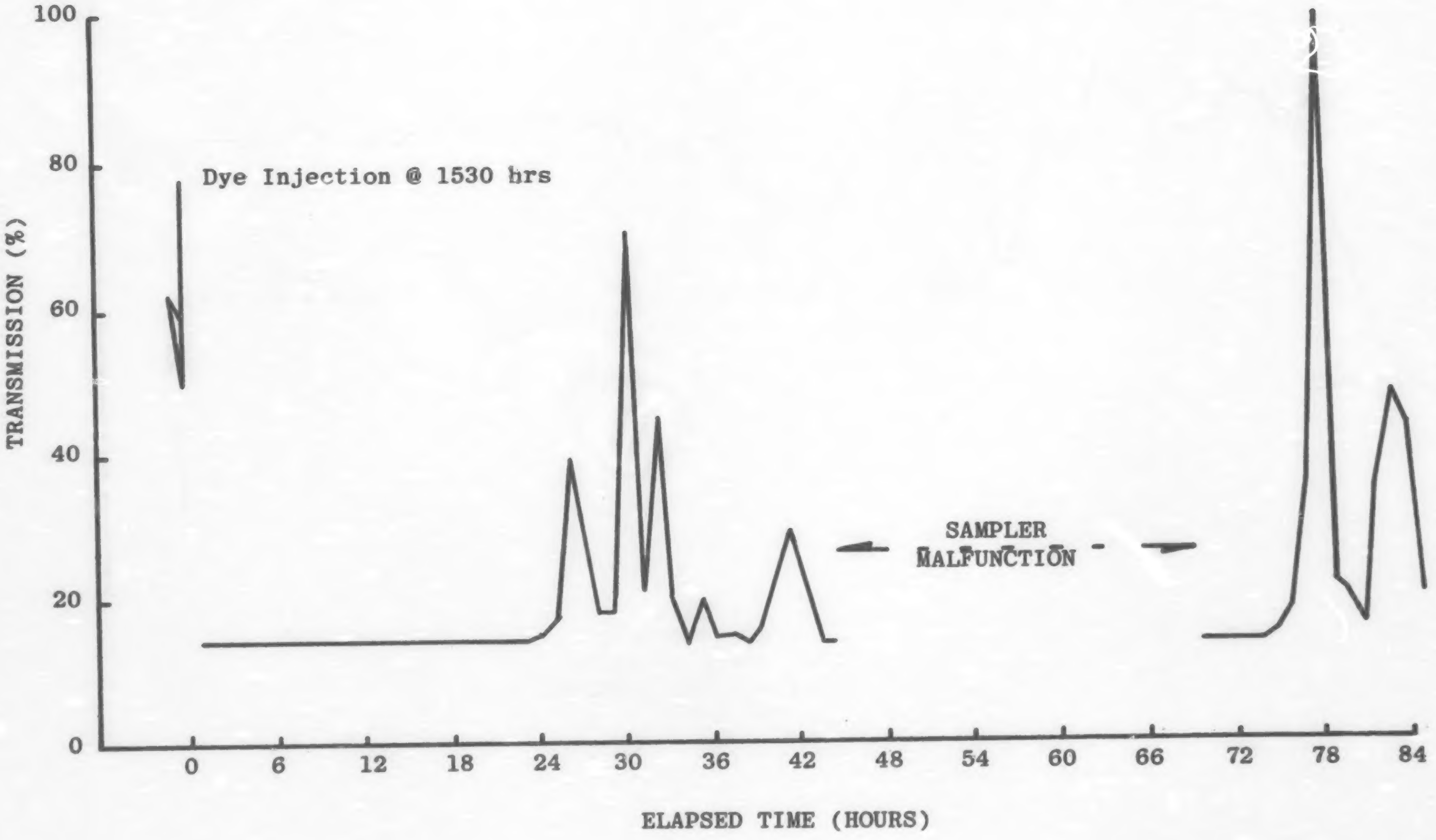


FIGURE 90
LEACHATE TRACING STUDY
ATLANTIC BEACH, NC
September 1974
Site A

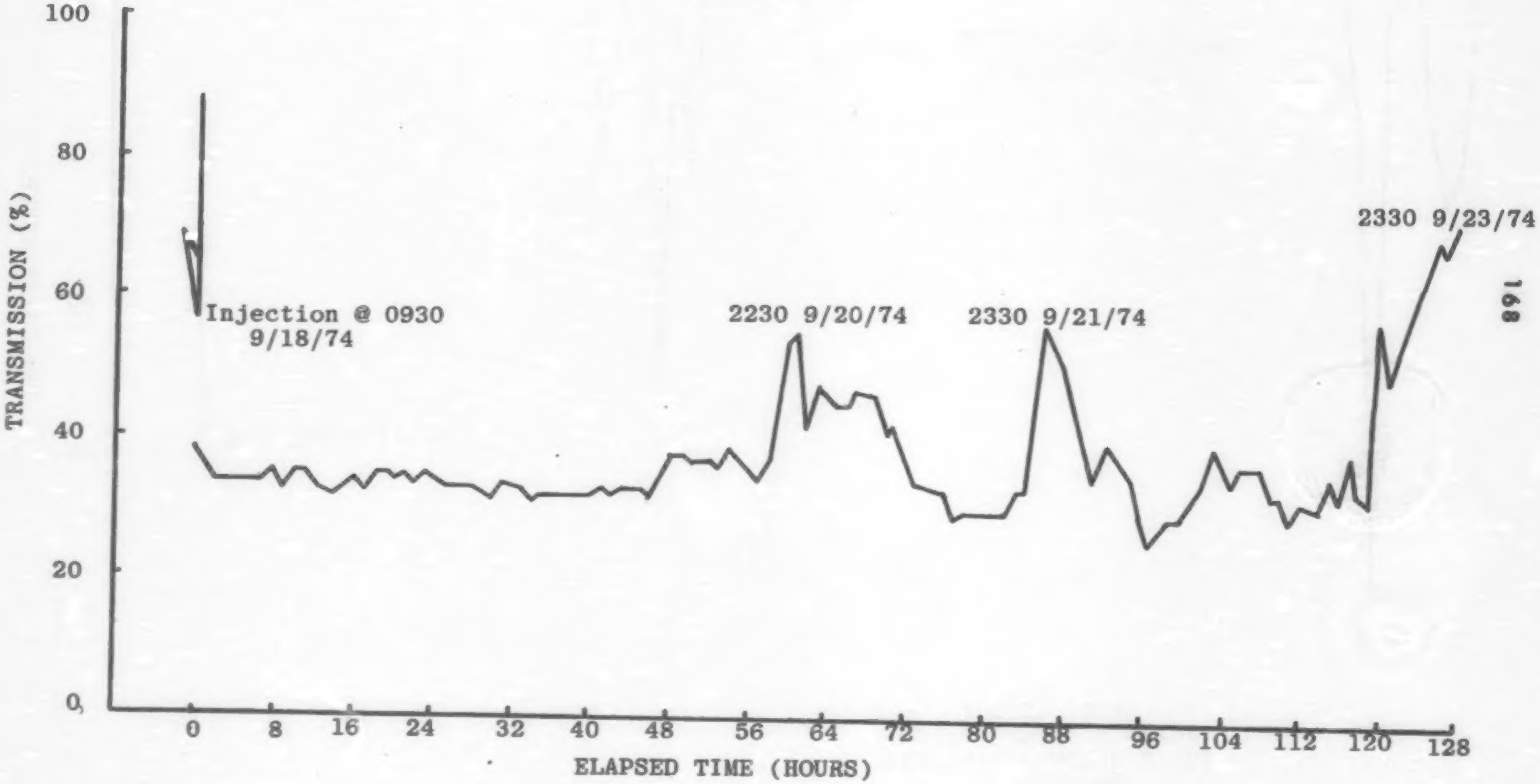


FIGURE 91
LEACHATE TRACING STUDY
ATLANTIC BEACH, NC
September 1974
Site B

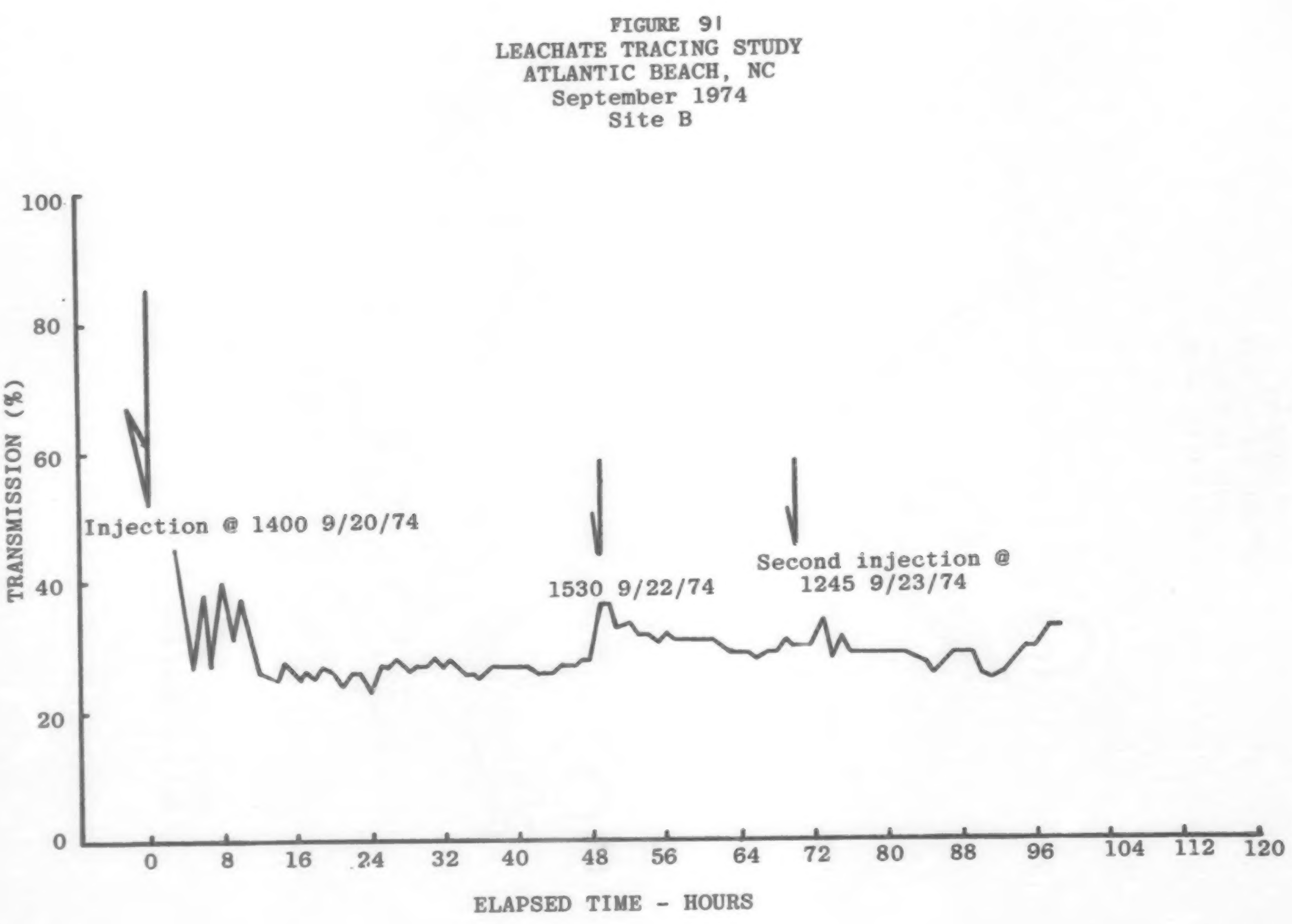


FIGURE 92
GROUND WATER WELLS
SURF CITY, N.C.
FEBRUARY, 1975

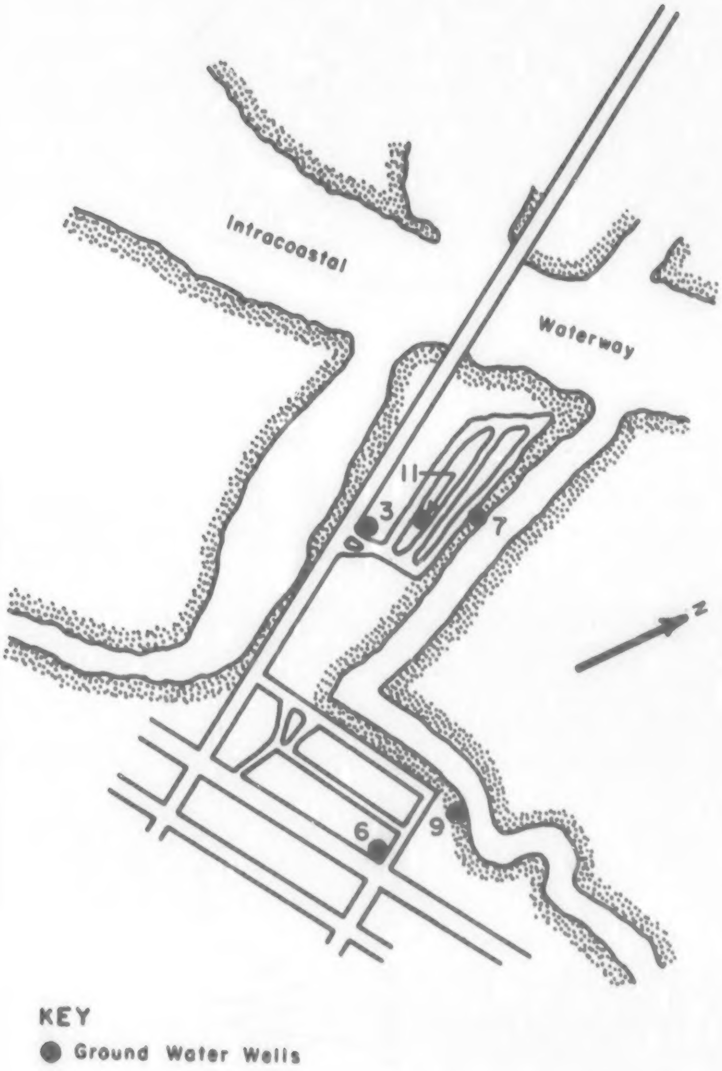
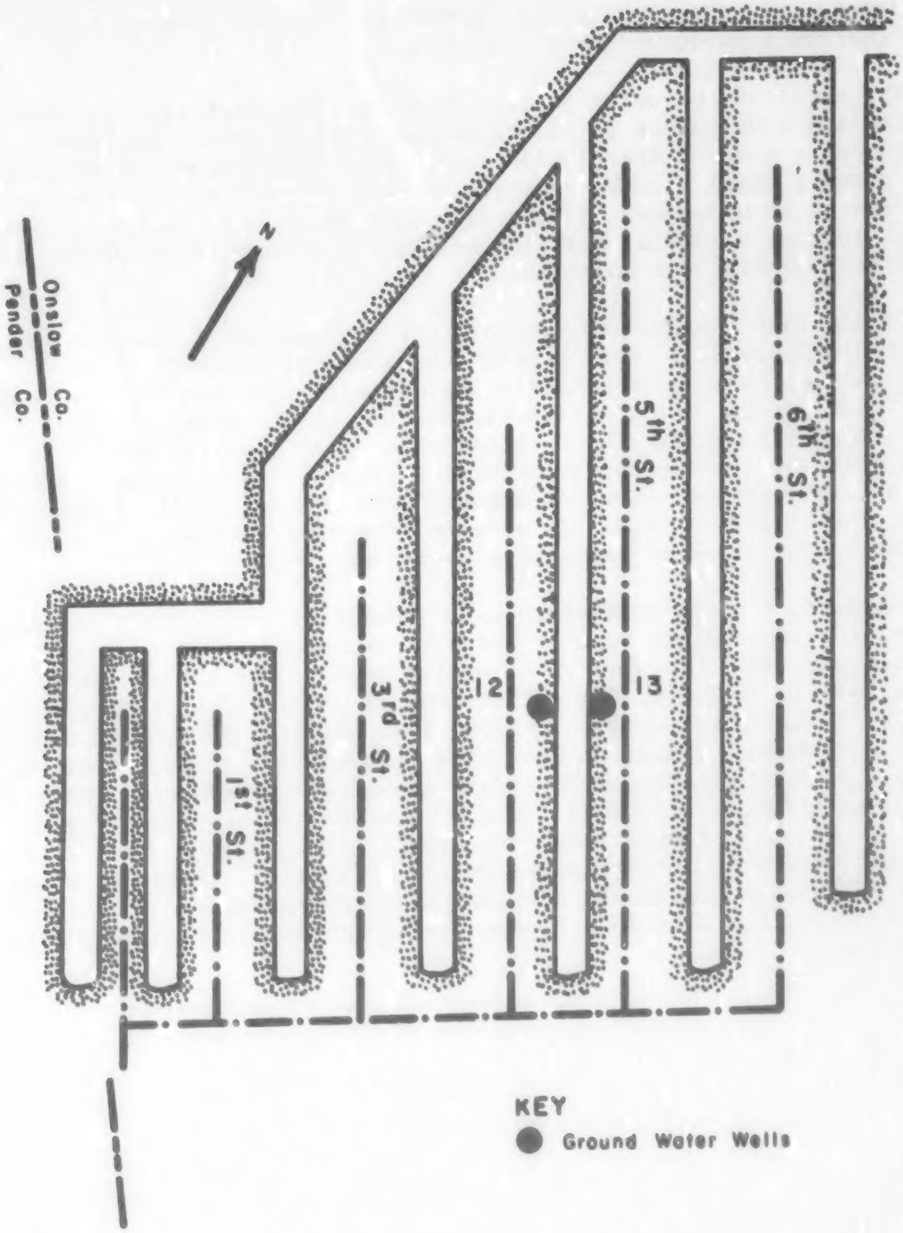

Intracoastal
Waterway
11
3
7
9
6
N
KEY
● Ground Water Wells

FIGURE 93
GROUND WATER WELLS
OLD SETTLERS BEACH
SURF CITY, N.C.
FEBRUARY, 1975


N
Onslow Co.
Pender Co.
1st St.
3rd St.
5th St.
6th St.
12
13
KEY
● Ground Water Wells

F. SYNOPTIC REVIEW OF THE ADVERSE ENVIRONMENTAL EFFECTS OF SEPTIC TANKS

Treatment and disposal of domestic wastes associated with coastal residential development is a problem of increasing magnitude. Much coastal development occurs in suburban localities, not served by municipal waste collection and treatment facilities and do not lend themselves to future service by such systems. As a result, rather than construct a costly permanent waste treatment plant or utilize package treatment facilities, septic tank disposal systems are the predominant type of waste treatment advocated by developers.

The magnitude of water quality problems attendant with coastal high density development is increasing at a rapid rate. Evidences of such water quality degradation are: the occurrence of nuisance aquatic plant growth, algal blooms, creation of anoxic zones in canal waters, the presence of offensive odors resulting from organic decomposition, and the loss of valuable shellfish harvesting areas closed because of excessive bacterial contamination.

Septic tank disposal systems are not the sole agent responsible for noted evidences of water quality degradation; however, their impact on the environment cannot be dismissed. Numerous factors, other than waste disposal, play a significant role in the adverse aspect of coastal development. The creation of complex canal systems with poor hydraulic flushing characteristics, excessive population density patterns, and surface runoff also contribute to water quality degradation in these developments. In essence, the very existence of development in any form impacts the natural environs.

Septic tank disposal systems have widespread application in many suburban locales and are popular means of household waste disposal. Estimates made by the U. S. Public Health Service and the Federal Housing Administration indicate that some 32 million people were served by septic tank systems in 1970 (19). Many of those served by septic tank systems reside in coastal developments. It is estimated that more than 50 percent of Florida's canal-type developments utilize septic tanks (20), and approximately 90 percent of the Florida Keys utilize septic tanks even though the soil in that area is considered unsuitable for satisfactory operation (21). In 1970, a Federal Water Quality Administration report disclosed that approximately 50 percent of Broward and Dade Counties, Florida remain on septic tank disposal systems (22).

The relative percent of newly constructed dwellings with septic tanks is decreasing; however, the number of new homes served by septic tank systems is increasing (23). Pollution control agencies, at both the State and Federal level, continue to review and, unfortunately, approve septic tank disposal systems in coastal zones where soil and groundwater conditions are unsuitable for satisfactory performance.

A septic tank disposal system consists of a septic tank and a subsurface percolation system. A septic tank is a water-tight container designed to separate floatable and settleable solids from the liquid portion of wastes. The liquid portion of wastes is then discharged to the soil through a drainfield percolation system. Basically, the septic tank has three functions: removal of solids, biological treatment (anaerobic), and sludge and scum storage (24).

The effectiveness of waste treatment by septic tank disposal systems is not necessarily governed by the operation of the septic tank, but rather by the soil sorption system (25, 26, 27). Treatment provided by the septic tank is minimal when compared to other forms of domestic waste treatment (Table XXXI). Treatment effectiveness and performance of the sorption field is largely dependent on geographical characteristics of the area where the system is located. Factors such as soil permeability, soil depth, groundwater level, slope of the ground surface, proximity to surface waters, and fractured or cavernous geologic strata must be the determinants used for locating satisfactory sites for septic tank systems (24, 25, 26, 27, 28, and 29). Failure to adequately evaluate a septic tank site in the context of the above factors, may result in the creation of a sanitary nuisance, a health hazard, and a source of surface and groundwater pollution.

According to Patterson et al. (26), "Failures of septic tank systems have been caused most frequently by one or more of the following conditions:

1. Lot size too small to provide adequate absorption field.
2. Soil not suitable for septic tank drainage.
3. Groundwater level too high.
4. Excessive numbers of septic systems in an area.
5. Inadequately sized septic systems.

The literature is replete with references of the widespread failure and malfunction of septic tank disposal systems. Failure of a septic tank system is characterized not only by the malfunction of the system, e.g., clogging, but includes wastes reaching the ground surface and the underground movement of wastes resulting in the contamination of groundwater, wells, and surface waters. Failure of septic tank systems because of poor soil conditions, either due to the impervious nature of the soil or to an overly pervious substrate, are numerous (20, 26, 28, 30, 31, 32, 33, 34). Similarly, high percent failure rates have been noted where a high groundwater level prevented proper system operation (20, 21, 26, 32, 35, 36).

"The total evidence available, circumstantial and otherwise, indicates that septic systems today exert a significant detrimental effect upon environmental quality" (26). These detrimental effects are both common and costly evidences throughout the Southeastern coastline (20, 37, 38, 39). The full impact that septic tank leachates have on coastal environments may never be completely recognized because of the subtlety with which they enter the affected waters.

Regulations governing septic tank installation and design criteria are promulgated and imposed by state and local environmental or health agencies. Jurisdictional lines for system approval within the state and local agencies are oftentimes determined by the size of the installation. As one might expect, regulations imposed on septic tank usage varies from state to state with the southeastern states being no exception.

All southeastern states have specific requirements regulating septic tank systems. Some of these requirements are summarized in Table XXXII for the six coastal southeastern states. Also included in the table are recommendations from the Manual of Septic Tank Practice, USPHS (24).

A review of state regulations controlling septic tank usage reveals a spectrum of specific requirements. The detailed regulations range from very vague and cursory to very thorough and comprehensive documents (40-45). More uniformity in regulations is needed, particularly as they apply to coastal zones.

Any regulation on septic tank installation practices should be based upon three parameters: (1) soil type, (2) horizontal distance from adjacent water bodies (3) vertical distance from groundwater surface. While the first parameter is equally important, the later two are much more enforceable and are of greater concern in coastal areas since soils in the coastal fringes are predominately sand. Based upon evidence to date, it seems prudent that septic tank/sorption fields be no closer than 100 feet from a surface water body and that these fields be 3 to 4 feet above the saturated soil zone at the wettest period of the year. However, even these minimum requirements may be inadequate; therefore, each proposed development should be examined in light of its environmental setting (i.e., water supplies, magnitude of development, density, hydrologic factors, water classification, pollution potential, etc.).

The role that septic tank disposal systems play in the spread of disease is impossible to accurately quantitate and, many times, difficult to identify or confirm. Their potential for creating health hazards has been recognized for years and is of continuing concern to public health authorities. The obvious area where public health effects may be demonstrated is in the contamination of groundwater used as public or private water supplies. Once a pollutant reaches the groundwater, it becomes responsive to the local pattern of groundwater movement (31).

Table XXXIII shows the incidence of known waterborne disease resulting from the consumption of untreated groundwater for the period 1946 - 1970 (46). For this 25-year period, there were some 72,358 cases of waterborne disease from all types of water systems (46). The fact that 30,594 cases of disease, or 42.3 percent, were transmitted by untreated groundwater, points out the significance of groundwater contamination in the spread of disease. This is further emphasized by estimates that only about 57 percent of the disease outbreaks in public water supply systems, and 33 percent of the outbreaks in private water supplies, are reported (46). Numerous waterborne illnesses go unreported because of either the mildness of the illness, the illness being mistaken as resulting from another source, or simply being treated at home without the involvement of a physician.

The extent to which septic tank disposal systems contribute to the number of waterborne disease outbreaks is unknown. The manner in which the waste may travel in the groundwater, together with the insidious nature of many waterborne disease outbreaks, complicates attempts to correlate disease outbreaks with septic tank disposal. Unlike surface water contamination, ground water contamination may be confined to a very limited area, resulting in localized disease manifestations.

Septic tank disposal systems have been suggested as the source of numerous waterborne disease outbreaks; however, many of these are never confirmed by complete field, laboratory, and epidemiological investigations (26, 30, 34, 46, 47).

However, there are numerous studies reported in the literature that do confirm the spread of waterborne disease by groundwater contaminated by septic tank discharges. A recent outbreak of gastroenteritis in Florida involving some 1,200 cases, resulted from the contamination of a public well located 150 feet from a septic tank. Dye studies confirmed that wastes travel from the septic tank to the well occurred in nine hours (48). Four cases of typhoid fever in 1972 were the result of a private well being contaminated by a septic tank located 200 feet away. Again, dye studies indicated movement of the waste from the septic tank to the well in 36 hours (49).

Movement of septic tank leachates through limestone formations, with subsequent contamination of private wells, has been documented. Dye from septic tanks was observed in a well 110 feet from the point of discharge in a 14-hour period. Several persons using this well developed gastroenteritis (28).

Several hundred cases of "sewage poisoning" have been documented as a result of consumption of groundwater contaminated by septic tank leachate. These cases are characterized by an inability to identify a specific etiologic agent responsible for the outbreak; thus the description, "sewage poisoning" (50, 51).

Several hundred cases of infectious hepatitis have been confirmed as being caused by consumption of groundwater contaminated by septic tank leachate (52, 53, 54, 55).

These confirmed illnesses resulting from the consumption of groundwater contaminated by septic tank leachates not only establish, but emphasize, the potential for such outbreaks where lateral movement of contaminated groundwater occurs. Available information gives further credence to the statement that "At best, septic tanks . . . are poor substitutes for central (sewage) collection and treatment systems and should be avoided whenever possible" (56).

The public health implications of septic tank discharges extend beyond the area of human consumption of polluted groundwaters. An area more difficult to assess is the impact that contaminated groundwaters have on surface water quality degradation. Although difficult to assess, it is nonetheless an area of extreme importance in delicate estuarine ecosystems. When contaminated groundwater is allowed to exchange with estuarine waters, a potential risk of disease transmission must be recognized by those using these surface waters for water contact recreation. Although bacterial and viral levels reaching surface waters via this route may be low, they do represent a potential source of disease transmission. Estimates indicate the virus content of polluted surface water to be on the order of 0.15 and 1.5 virus units per 100 ml of water (57). However, even these low densities may be of significance in view of reports in the literature that as few as one infective tissue dose is sufficient to induce infection (58).

The fact that enteric bacteria and members of the enteric virus family survive for significant periods of time in water affirms the potential for contaminated surface water as a route of disease transmission. As much as 100 days might be required for inactivation of 99.9 percent of the viral infectivity of some enteric viruses in surface waters (59).

Another area of concern, but not well understood, is that of the fate of viruses once they are adsorbed to particulates and become incorporated in the sediments of coastal zones. Gerber and Schaiberger (60) stated; "It now seems reasonable to hypothesize that viruses entering coastal waters readily adsorb to particulate matter that prolongs their survival. Settling of this material, aided by the electrolytic effect of seawater, could result in viral accumulation in sediments. Here, viruses would remain undetectable in the overlying water to be later resuspended by wave action, dredging, increases in the amount of organic matter, or possibly changes in salinity." The possibility that such a sequence of events could occur in coastal zones as a result of septic tank leachates definitely merits concern and research because of its public health implications.

Aside from the risk associated with water contact recreation in estuarine waters contaminated by septic tank leachates, the contamination of shellfish inhabiting these waters poses an additional consequence when consumed. Shellfish, e.g., oysters, have been shown to effectively concentrate bacteria and viruses; thus, when consumed, either raw or partially cooked, they may serve as vehicles for pathogen transmission (61, 62, 63). The occurrence of bacterial and viral disease outbreaks from consumption of shellfish contaminated by sewage pollution has been demonstrated many times and has resulted in the regulation of shellfish-growing water quality (64).

It is generally accepted, and well documented, that under ideal soil and hydrological conditions, the percolation of treated sewage through several feet of fine unsaturated soil will effectively remove bacteria and viruses (65, 66). However, the character of the soil, the hydrology of the area, and the rate of application all play an important role in the filtering capacity of the soil. Effective removal of bacterial and viral contaminants has been reported by percolation through soil for depths of a few inches (65, 66, 67).

The character of the soil not only affects the rate of travel but also the degree of reduction of bacterial contamination with distance. Travel distances of biological contaminants in groundwater have been reported to range from a few feet to several hundred feet. Reports of distances traveled by coliform bacteria range from 10 to 2,000 feet, with the majority of distances ranging from 10-400 feet, (25, 65, 68, 69), Tables XXXIV and XXXV. The rate of travel of bacteria is less than that of dissolved chemical pollutants. Varying rates of travel are cited in the literature (26, 65, 68, 69, 70). The rate of chemical travel in groundwater varies with soil conditions but is documented as being much faster than the rate of transport of biological contaminants (65, 69).

The survival times of enteric bacteria in water and soil have been reported to be from several days to years (Table XXXVI). Even though inconsistencies in survival times are reported in the literature, survival is of sufficient times for bacterial contaminants to be transported over relatively long distances (26, 63, 68). The significant distances that biological and chemical pollutants travel in groundwater, and the exchange between groundwater and surface water, emphasize the potential that polluted groundwater has for contaminating surface water.

The pollution of coastal canals with groundwater contaminated by septic tank leachates has been documented with dye tracer studies conducted by EPA in Florida and North Carolina. Tracer dyes introduced into septic tank systems located approximately 50 feet from finger-fill canals were rapidly transmitted to the adjacent canal waters. In southwestern Florida, the leachates reached the canal in 25 hours while at two separate North Carolina sites, travel times of 4 and 60 hours, respectively, were recorded. Violations of applicable coliform standards were recorded in canal developments utilizing septic tank disposal systems in both Florida and North Carolina study sites.

Additional studies are presently underway at a finger-fill canal development in North Carolina designed to determine the impact of septic tank leachates on adjacent canal waters. No dye tracer studies have been conducted to date; however, examination of preliminary groundwater data indicates considerable nutrient enrichment in the vicinity of the septic tanks and wells.

The high groundwater level and porous soil conditions in some of the coastal areas allow for a free exchange of contaminated groundwater and receiving estuarine waters. Consensus of those experts contributing to a report on the environmental effects of waterfront canals was that a substantial proportion of the pollution reaching canal waters can be attributed to septic tank installation (20).

Recognizing the potential for surface water contamination by septic tank leachates, most states have regulations requiring a minimum setback distance from surface waters of 50 feet. The state of North Carolina has proposed a minimum setback distance (nitrification field) of 100 feet from coastal waters classified for shellfish harvesting (44).

It has been indicated that the movement of contaminants through at least 100 feet of unsaturated soil is necessary for effective cleansing in those areas where the groundwater is subject to exchange with surface waters (29), and that in general, no seepage field be located closer than 300 feet to a channel or water course (29). Even with such a minimum setback requirement, dissolved nutrients may still reach waterways and constitute the potential for creating a biotic imbalance.

Although data delineating the exact relationship between high density septic tank usage and environmental problems in coastal developments are not extensive, water quality degradation in many of these developments is extensive. The bulk of evidence suggests that varying degrees of water quality degradation occurs in the majority of intermediate to high density coastal developments utilizing septic tank disposal systems. Application of septic disposal systems where high groundwater levels prevent effective operation and groundwater gradients are such that adjacent waterways become the repository of a portion of these biological and chemical wastes must be viewed as being partially responsible for observed ecological imbalances.

Presently, the unlimited utilization of septic disposal systems in coastal developments where operational efficiencies are suspect certainly is inconsistent with the application of best applicable waste treatment technology and should be minimized or abandoned.

The ultimate goal in the development of waterfront properties must be to provide homesites at the lowest present and future environmental cost. Thus, the objective of the regulatory agencies, developers and the public must be to demand the application of best applicable waste treatment technologies and techniques in the creation of waterfront properties.

TABLE XXXI
TYPICAL PROCESS EFFLUENT CHARACTERISTICS

PARAMETER	Septic[1] Tank	Activated Sludge	Advance Waste Treatment
5-Day Biochemical Oxygen Demand	223 mg/l	20	4
Ammonia Nitrogen	39.7 mg/l	15	-
Orthophosphate	7.7 mg/l	-	-
Suspended Solids	39 mg/l	20	5
Total Nitrogen	-	20 mg/l	7
Total Phosphorous	-	10 mg/l	1
Coliform Bacteria	5 million/ 100 ml[2]	100/100 ml	100/100 ml

[1] Barshied & El-Baroudi "Physical and Chemical Treatment of Septic Tank Effluent", Journal Water Pollution Control Federation, Vol. 46, No. 10, October 1974.

[2] Robeck, G.G., T.W. Bendixen, W.A. Shwantz, and R.L. Woodward, 1964. "Factors influencing the design and operation of soil systems for waste treatment." Journal, WPCF,36:971.

TABLE XXXII
GENERAL SEPTIC TANK INSTALLATION CRITERIA

	AL	FL	GA	MI	NC	SC	FED. 2/
Soil Classification Reqd.	-	Yes	Yes	Yes	Yes	Yes	Yes
Maximum Density (Housing)	-	3/	-	-	3 Units/ACRE	-	-
Percolation Test Reqd.	Yes	Yes	Yes	Yes	-	Yes	Yes
Maximum Percolation Rate	60 Min/in.	15 Min/in.	45 Min/in.	-	-	-	30 Min/in.
Minimum Water Table Depth Below Ground Surface	60 in.	36 in.	4/	1/	-	36 in.	-
Minimum Water Table Depth Below Draintile Invert	-	-	-	-	-	-	48 in.
Nitrification Field Set-back from Well	6/ 50	100 ft.	100 ft.	100 ft.	5/ 500 ft.	100 ft.	100 ft.
Nitrification Field Set-back from Surface Water	-	50 ft.	50 ft.	-	100 ft.	50 ft.	50 ft.

1/ & 4/ Shall not be installed where groundwater may interfere with absorption of treated sewage.

2/ Manual of Septic Tank Practice. USPHS, 1967.

3/ When platted subdivision reached 50%, density then central sewage treatment facility is required.

5/ 1,500 feet from shallow water supply (less than 50 feet)

6/ 75 feet from public water supply.

TABLE XXXIII

INCIDENCE OF WATERBORNE DISEASE IN THE UNITED STATES, 1946-70, DUE TO SOURCE CONTAMINATION: GROUND WATER (UNTREATED) 1/

CAUSE	PRIVATE		PUBLIC		ALL SYSTEMS	
	OUTBREAKS	CASES	OUTBREAKS	CASES	OUTBREAKS	CASES
Improper construction or location of well or spring						
Surface contamination nearby	21	640	1	2,500	22	3,140
Overflow of seepage of sewage	49	2,779	4	531	53	3,310
Seepage from abandoned well	1	50	-	-	1	50
Source of contamination not determined	8	235	1	400	9	635
Flooding	4	66	3	4,400	7	4,466
Contamination through creviced limestone or fissured rock	10	555	1	70	11	625
Chemical or pesticide contamination	4	17	-	-	4	17
Data insufficient to classify	46	2,001	3	16,350	49	18,351
TOTAL:	143	6,343	13	24,251	156	30,594

1/ -- Source: Craun, Gunther F. and L. J. McCabe (1973). Jour. AWWA. 74 p.

TABLE XXXIV
DISTANCE OF TRAVEL OF FECAL MICROORGANISMS[1]

Type of Organism	Distance Transported, ft.		Reference
	Vertical	Horizontal	
E. coli		232	Warrick and Muegge, 1930
E. coli	10-30		Mom and Schaafsma, 1933
E. coli		80	Caldwell, 1937a
E. coli		400	Dappert, 1932
Coliform bacteria		10-400	Miller, et al.,1957
Coliform bacteria	2-3		Malia and Snellgrove,1958
Coliform bacteria		180	Randall, 1970
Coliform bacteria	150		Hickey and Duncan, 1966
Clostridium welchii	7-8		Hickey and Duncan, 1966
"Lactose Fermenters"	2.5	2.0	Giovanardi, 1938
"Bacteria"	6	1.5	Szoplik and Milkowska,1961
"Bacteria"		2000	Walker, 1969

[1] Source: Patterson, J.W. et al.(1971) Septic Tanks and The Environment. State of Illinois Institute for Environmental Quality.

TABLE XXXV
SUMMARY OF DISTANCES OF TRAVEL OF POLLUTION1/

Nature of Pollution	Pollutant	Observed Distance of travel feet	Time of travel
• Sewage polluted trenches intersecting ground water	coliform bacteria	65	27 wk
	chemicals	115	
• Polluted trenches intersecting ground water	coliform bacteria	232	
	uranin	450	
• River water in abandoned wells	intestinal pathogens	800	17 hr
	tracer saits	800	17 hr
• Sewage in bored latrines intersecting ground water	coliform bacteria	10	
	anaerobic bacteria	50	
	chemicals	300	
• Sewage in bored latrines lined with fine soil	coliform bacteria	10	
• Sewage in bored latrines intersecting ground water	coliform bacteria	35	
	chemicals	90	
• Sewage in bored latrines intersecting ground water	coliform bacteria	80*	
• Coliform organisms introduced into soil	coliform bacteria	164	37 da
• Sewage effluent on percolation beds	coliform bacteria	400	
	ammonia	1,400	
• Sewage effluent on percolation beds	bacteria	150	
• Sewage polluted ground water introduced bacteria	bacteria	**	
• Chlorinated sewage	Serratia marcescens	69	9 da
	phenols, fungi	300	
• Industrial waste	dye	300	24 hr
	tar residues	197	
	picric acid	++	
• Garbage leachings	misc. leachings	1,476	
• Industrial wastes	picric acid	15,840	
• Industrial wastes in cooling ponds	Mn, Fe, hardness	2,000	4-6 yr
• Garbage leachings	misc. leachings	2,000	

TABLE XXXV (Continued)

Nature of Pollution	Pollutant	Observed Distance of travel feet	Time of travel
● Garbage reduction plant	Ca, Mg, CO_2	500	
● River water	Fe, misc. chemicals	164	
● Chemical waste	misc. chemicals	#	
● Industrial wastes	chromate	1,000	3 yr
	phenol	1,800	
	phenol	150	
● Salt	chlorides	230	
● Oil field brine	chlorides	1,300	
● Salt	chlorides	200	24 hr
● Gasoline	gasoline	10,560	
● Weed killer wastes	chemical	105,600	6 mo
● Radioactive rubidium chloride	radioactivity		5 da

*Regressed to 20 feet
**A few feet
++Several miles
#From 3 to 5 miles

1/Source:Task Group Report. "Underground Waste Disposal and Control."Jour. AWWA.:1334.1957

TABLE XXXVI. TIME OF SURVIVAL OF FECAL BACTERIA[1]

Type of Organism	Survival Time Septic Tank	 Soil	Reference
Salmonella typhosa			Caldwell, 1933
Salmonella typhosa			Warrick & Muegge, 1930
Salmonella typhosa	27 days	24-41 days	Beard, 1938
Salmonella typhosa	24 days		Green & Beard, 1938
E. coli			Warrick & Muegge, 1930
E. coli		2 yrs.	Mom & Schaafsma, 1933
Coliform Bacteria		3 mos.	Malin & Snellgrove, 1958
Coliform Bacteria		4-7 days	Subrahmanyan and Bhaskaran, 1950

1/ Source: Patterson, J.W. et al. (1971) Septic Tanks and the Environment, State of Illinois Institute for Environmental Quality.

G - BIOLOGY

1. Benthic Macroinvertebrates

Depending on firmness of the substrate, a Petersen or Ekman grab device was used to obtain at least four replicate samples of the benthic community. This type of sampling was limited to the central portion at each canal station. Macroinvertebrates were separated from the sediments by sieving through a U. S. Standard No. 30 screen sieve. Organisms were preserved in alcohol and returned in tagged sample bottles to the Athens laboratory, where they were identified, counted, and reported as number of animals per square meter. Sampling sites coincided with water quality and sediment sampling stations.

Sampling of the near-shore areas of the canals was by qualitative means. Numerous samples of debris, vegetation, and rocky substrate were obtained with a variety of implements including dip nets, screens, and grab devices. Samples were preserved and returned to the laboratory for processing.

Essential to the establishment, growth, and maintenance of a benthic community of diverse animals is the chemical and physical climate of the sediments and water. Composition of sediments in terms of particle size (texture) is of importance to life styles of numerous animals. Burrowing, tube-dwelling forms of animals are often associated with soft, finely divided sediments such as mud and silt; whereas, free-living types are found in association with coarse, possibly firmer material, like sand. Chemical conditions associated with sediments bear heavily on structure of the benthic animal community. Presence of non-living organic matter in bottom deposits is a natural consequence of detrital input into Gulf-coast estuaries. Although this material can be vital to benthic animals, excessive accumulations of this matter can constitute a liability to the community. Remineralization of the material places added demands on the DO budget. With insufficient resources of free oxygen, the system becomes anaerobic and the generation of toxic gases begins. Toxic gases coupled with a lack of dissolved oxygen forces a reduction in animal density in the benthic community. Various kinds of organisms are eliminated from the benthic community in the order of their order of tolerance to the anaerobic effects.

At the Punta Gorda location, sampling for benthic macroinvertebrates was restricted to the November 1973 survey. The numbers and kinds of benthic macroinvertebrates found in November followed a similar pattern of longitudinal distribution in both canals (Appendix E-1.1 and E-1.2). Maximum numbers of animals and diversity of taxa occurred at the mouth of the canals (Stations 3 and 7) and at the background site (Station 4). The dead-end regions of the canals (Stations 1 and 5) supported the fewest number of organisms and was represented by the least number of taxa.

Polychaete worms, small mussels and clams, and amphipods were numerically dominant in the benthic community. Polychaetes were common to all stations in Canal II but only present at Station 3 in Canal I. With the exception of the background site (Station 4), the type of annelid worm found inhabiting the canals was a member of the subclass Errantia--a classification of individuals that is basically carnivorous in feeding habits, free-living, and associated with a mud-sand substrate. Opposing this group of annelids is the subclass Sedentaria which is characterized by individuals that are filter-feeders, restricted to permanent burrows, and usually associated with substrates of mud and silt. The absence of members of the Sedentaria classification appeared related to the dominant particle size of the sediment of Canals I and II. Both canals featured sediment particles of the medium-fine sand category which is apparently better suited for the life style of polychaetes belonging to the free-living forms of the subclass Errantia.

Considering, in general, the feeding habits of amphipods, the apparent distribution of these organisms may be keyed to the relative state of organic decomposition of the sediments. Amphipods, in general, exist as grazing organisms feeding on living components of the periphytic community and detritus. The community of bacteria colonizing the detrital particles constitutes a rich source of proteins. This source of protein in terms of yield would tend to be maximized in sediments supporting active organic decomposition. A majority of amphipods were found at Stations 3 and 4--stations supporting C:N ratios of 20:1 and 40:1 respectively (Table XXVI). Also, Station 3 was the only canal site supporting some benthic vascular plants. Plants provided substrate for the development of a periphytic community and served as a mechanism for trapping and retaining detrital particles.

Station 1 posed a contradiction to the above regarding amphipod abundance being related to the relative state of sediment decomposition. This station was represented by sediments that indicated an area of active decomposition (C:N of 30:1). However, amphipods, as well as nearly all other forms of macroinvertebrates, were absent from the benthic community. Absence of benthic life was most likely related to the toxic effect of an extensive buildup of sediment sulfide concentrations that were 2 to 10 times greater than at any other stations sampled (Table XXIV).

Results of sampling at Big Pine Key for the November 1973 and August 1974 surveys are reported in Appendices E-1.1, E-1.3, and E-1.4. Numerically, the distribution of organisms was related to longitudinal position in the canals. The number of animals per square meter of substrate increased with distance from the dead-end reaches of each waterway. This feature persisted during both surveys. At the time of the November survey, organism diversity remained fairly uniform with respect to longitudinal position. This trend was modified in August when diversity was minimized at the dead-end stations.

Annelid worms and crustaceans were the most abundant members of the benthic macroinvertebrate community. The numbers of polychaete worms were well-divided between the free-living and sedimentary forms. Referral to Appendix D-2.1 will indicate that, unlike Punta Gorda, hydraulics in the Big Pine Key canals favored the accumulation of silt and clay particles in the sediments, but with mixtures of fine to coarse sand--a combination suited for both forms of polychaetes. In August, a new member of the annelids was reported for the benthic community. Tubificid worms were found in nearly all of the samples taken from the developed canal (IV). Marine oligochaetes can play an important role in polluted environments where the benthic habitat is excessively enriched with organic matter and oxygen can become depleted (71, 72).

Crustaceans were best represented by amphipods. In November, at least 10 families were found inhabiting the canal systems. As indicated previously, these animals are grazers of living and dead plant material; hence, amphipods would tend to maximize their numbers in canal regions supporting benthic flora, providing ample DO is available and the benthic environment is free of toxic sulfides. This was the case with Canals III and IV in November. The organisms attained their greatest numbers in bottom regions of maximum abundance of benthic macrophytes.

In August, the kinds of organisms representing the crustaceans were markedly reduced. For example, only five families of amphipods could be identified, with nearly all of the individuals being associated with the undeveloped canal (III). These observations would appear related to seasonal change in benthic plant abundance. Seasonal differences in standing crop biomass (g ash-free wt/m^2) of benthic plants are indicated below.

		Biomass	
Location	Station	November 1973	August 1974
Canal III	8	14.4	11.7
	10	14.1	9.2
Canal IV	12	17.0	0.8
	14	34.9	8.0

The Sea-Air Estate canal featured benthic macroinvertebrates quite different in terms of taxa compared to the Big Pine Key waterways. Aside from the annelids and nematodes, the two canal systems had only seven families of benthic macroinvertebrates in common. Although the canal systems contained sediments of comparable character (particle sizes and C:N ratios), the Sea-Air waterway was substantially deeper and void of benthic attached plants. Also dissolved oxygen concentrations were often less than 2 mg/l.

Sampling at Station 19 (outside of the canal area) revealed a benthic macroinvertebrate community comprised of 40 various kinds of organisms with a numerical average of over 3,000 individuals per square meter of substrate. The number of taxa and individuals found at the canal stations ranged from 7 to 10 and 338 to 718 per square meter of substrate respectively (Appendix E-1.5).

The numbers and kinds of benthic macroinvertebrates found occupying the bottom sediment of the Atlantic Beach canals were representative of a poorly developed community (Appendix E-1.6). Sampling at three of the five developed canal stations (1, 4, and 5) showed a total absence of macroinvertebrates. At Station 3 of the heavily developed canal, the maximum numbers of taxa and individuals were found (12 and 740 per square meter of substrate, respectively).

The numerical distribution of benthic organisms followed a trend relating to longitudinal position in the canals. The number of animals and the diversity of kinds decreased with distance from the mouths of the canals. This distribution paralleled the same trend for DO values near the bottom, and heavy metal and organic matter concentrations in the sediments.

At Spooners Creek, only three stations were sampled. The number of taxa found ranged from one to four kinds of organisms. Two of these taxa were polychaetes which were numerically the predominant macroinvertebrate of the community (Appendix E-1.6).

2. Macrophytes

Macrophytes are an important component of many estuaries and off-shore waters along Florida's coast. They are invaluable as a habitat and food source for the myriad of species dependent upon them for functional support. Chronic environmental perturbations altering the structure and function of plant communities will ultimately affect other trophic levels, including the highest trophic level--man. The ability of plants to respond to subtle perturbations is a useful warning device which investigators can use prudently to correct previous injudicious decisions.

Plant harvesting techniques were used to derive estimates of standing crop biomass for the macrophytes. Sample gathering was based on random selection (using tables of random numbers) with replication. A quarter-meter-square frame was used to isolate quadrats of the plant community at selected points along transects perpendicular to the shore. Isolates of vegetation were harvested (excluding roots), sorted into groupings of species, refrigerated, and returned to the Athens laboratory for processing. Laboratory analysis included drying samples at 105°C and igniting the material at 500°C in a muffle furnace. Prior to burning, the plant material was subjected to a mild acid digestion (5-percent HCl) to relieve the vegetation of carbonate incrustations. Drying and igniting procedures were as described in EPA Biological Field and Laboratory Methods (73).

An extensive macrophyte sampling program was not initiated in the Punta Gorda canals because macrophytes were not observed or collected during an earlier reconniassance survey. During the 2-week survey of November 1973, extensive growths of two macroalgae, _Ulva_ and _Enteromorpha_, were observed on the mudflats near reference Station 4. According to Humm (74), _Ulva_ and _Enteromorpha_ commonly respond to added nutrients such as sewage effluents. The source of this apparent nutrient enrichment seems tracable to the finger-fill canals adjoining Alligator Creek. Referring to the mass exchange studies, Canals I and II were exporting significant quantities of nitrogen and phosphorus to Alligator Creek.

Sparse amounts of a vascular plant, _Ruppia_ _maritima_, were also collected at the mouth of Canal I during the November survey. Limited amounts of vascular plants and macroalgae in the canals can be attributed to bottom instability and minimal light penetrations. As indicated in Appendix D-2.1, the inorganic fraction of the sediments (sand) reached greatest representation at the mouth (Station 3) of Canal I, where _Ruppia_ was observed. Medium sand (69 percent by weight) was the predominant substrate particle at Station 3. However, at Station 1, the substrate featured a predominance of finer material (27 percent silt, 18 percent fine sand) which is a less stable substrate for plant attachment. Sufficient sediment stability and light penetration (greater than light compensation level of 1 to 2 percent) are two prerequisites for most vascular plant growth. It is evident that these essential conditions were met at the mouth of Canal I (Appendices D-2.1

and E-5) as small amounts of Ruppia were able to grow at Station 3. No macroalgae or vascular plants were collected from the bottom of Canal II, although there was sufficient light reaching the bottom for sparse plant growth. Apparently bottom instability and other factors inhibited plant growth in Canal II. Anoxic conditions such as demonstrated in August 1974 would preclude any carryover of benthic plants to the dry season.

At Big Pine Key, 24 algal species and two vascular plant species were collected from the study area in November 1973, and 14 algal species and three vascular plant species were collected in August 1974 (Appendices E-2.1, E-2.2, E-2.3 and E-2.4). An equivalent reduction in number of species was observed in both Canals III and IV.

Halodule wrightii, a vascular plant, and an unidentified species of green alga, *Cladophora* sp., were collected at all stations in 1973 and 1974.

Halodule wrightii occupies an extensive geographical range extending throughout the Gulf of Mexico and up to the lower Cheasapeake Bay. This species is considered tolerant of extreme environmental conditions. Greatest growth is in the intertidal zone, but it is also found in deeper water with *Thalassia* (75). In terms of standing crop biomass it dominated the flora at all stations in Canal 3 both in 1973 and 1974. It was present in Canal IV in 1973 and 1974 and dominated at Station 14 in 1974.

Thalassia testudinium, which was present in many collections in 1973 and 1974, did not predominate at any of the stations in 1973 (Appendices E-2.3 and E-2.4). In 1974, it was a predominant at the mouth (Station 14) of developed Canal IV. *T. testudinium* is the most abundant species in the eastern Gulf of Mexico, where it may account for 60 to 75 percent of all seagrasses in terms of bottom cover and biomass (75). However, its predominance in the canal system was generally negligible.

Penicillus and other Siphonales such as *Caulerpa* and *Halimeda* are able to colonize unconsolidated sediments and are usually found together with seagrasses (74). However, where the standing crop of *Thalassia* is low, *Halimeda* and *Penicillus* will predominate (74). *Halimeda incrassata* was predominant in Canal IV but only present in Canal III during both study periods. This difference can be partially attributed to the greater amount of sediments richer in organic matter in developed Canal IV.

Average plant standing crop biomass in terms of ash free weight (AFW) in the study area during 1973 and 1974 (Tables XXXVII and XXXVIII) ranged from 0.81 to 34.94 g/m^2. The high and low of this range were recorded from Canal IV.

In 1973, differences in plant community biomass between canals were insignificant at the 90-percent confidence interval (Figure 94). The wide variances among samples within a canal were primarily due to heterogeneity of plant distribution on the bottom of the canals.

A greater number of plant samples would have reduced the statistical variances within a canal. In 1974, sample replicates were increased in an effort to reduce variability and discern statistical differences.

There was an average increase in biomass (AFW) at Canal IV in 1973 from the end to the mouth of the canal. This trend may reflect a subtle plant response to increased nutrient load and reduced water circulation. This longitudinal increase in biomass at Canal IV reflects the influence plants had on dissolved oxygen in the canal. The disparities between bottom and surface DO's from the end of the canal to the mouth are evident in Figure 51 and suggests that greater plant biomass effected greater DO variations from surface to bottom toward the mouth of the canal.

In 1974, there was a significant difference in standing crop biomass between Canal III and developed Canal IV (Figure 95). Standing crop biomass was not only reduced between canals, but there was a seasonal reduction from 1973 to 1974 in plant biomass at Canal IV, especially at the dead end of the canal (Table XXXVIII).

3. Periphyton

The periphyton community is a unique assemblage of organisms which spend at least part of their life cycle attached to substrates within aquatic environs. Their ability to react to subtle environmental perturbations via changes in growth response and species composition is well-documented, and aquatic biologists have successfully used this community to monitor waters suspected of being under stress.

During the Punta Gorda and Big Pine Key study, glass slides (diatometers) were placed in the canal systems to evaluate community growth response and changes in periphytic species composition as well as to determine the optimum time for periphytic colonization as it relates to monitoring activities in semitropical estuaries.

Artificial substrates were placed at the mouth and end of each study canal and reference station on November 13, 1973. At Punta Gorda replicate slides were removed from the diatometers on days 4, 6, 10, 13, 19, 23, and 29 by Mr. Richard Cantrel of the Florida Department of Pollution Control. Replicate slides were left in the Big Pine Key stations for 37 days before they were extracted from the samplers.

For each incubation period, three replicate slides were used for chlorophyll and biomass (AFW) analyses and two replicate slides were subjected to Sedgwick-Rafter counts. All analyses were conducted according to EPA Biological Field and Laboratory Methods Manual (73). Chlorophyll a measurements were corrected for phaeophytin a (a degradation product of chlorophyll a). Autotrophic indices were derived from chlorophyll a and biomass values according to the following equation:

$$\text{Autotrophic Index} = \frac{\text{ash-free weight in g/m}^2}{\text{Chlorophyll } \underline{a} \text{ in g/m}^2} \qquad \text{(Eq-8)}$$

Numerically, pennate diatoms were the predominant components of the algal and protozoan flora at each station (Appendix E-3.1). These are usually the predominant diatom found on substrates.

The successional sequence of colonization proceeds from a bacterial predominance to diatom predominance and then diversification to bacteria, diatoms, green algae, blue-green algae, protozoans, etc. This is a normal sequence of succession on slides placed in freshwater and is apparently the same for slides in the estuarine system (Appendix E-3.1). From day 19 through day 29 at Stations 1, 3, and 7, green filamentous sporelings were observed on the slides but not counted. Protozoan vorticellids appeared in Canal I along with green filamentous algae. The presence of *Oscillatoria*, a blue-green alga usually tolerant of high organic loads, at the end of Canal II suggests the periphyton community was reacting to a slight increase in organic matter and possibly nutrients along this developed canal.

Periphyton slides were allowed to incubate from November 29 to December 27, 1973 (29 days) at the Big Pine Key stations. A number of slides were lost during the 29-day period, and only slides from the end of Canal IV and mouth of Canal III were recovered after 29 days of incubation. Pennate diatoms were predominant on the slides in both canals. Coccoid blue-greens and quiescent green flagellates were present on Canal IV slides (Appendix F-3.2). The presence of blue-greens and green flagellates may be a response to nutrient load in Canal IV, which is exposed to septic tank drainage and street runoff.

All photosynthetic plants contain chlorophyll a except bacteria; therefore, this pigment is highly specific for plants and is a relative means of estimating algal standing crop or growth after correcting for phaeophytin a.

Algal growth at the mouth of Canal II (Figure 96) was in a lag phase for the first 10 days before exponentially increasing from days 10 to 19. Exponential growth appeared to subside at day 23, but the algal community continued to multiply until day 29, when it attained its average maximum yield of chlorophyll a (149.3 mg/m^2). As indicated in Appendix E-3.3, extensive variances, like those found at day 23, were attributed to excessive filamentous green algal growths on only one or two replicate slides.

At the end of Canal II, the algal community immediately initiated an exponential growth phase (Figure 96) and attained an average maximum yield of 77.7 mg/m^2 after 19 days of growth.

Diatom samples were lost at reference Station 4 after 10 days of incubation, and a maximum yield of 45.3 mg/m^2 was recorded after 10 days' growth.

The algal community at the mouth of Canal I (Figure 97) did not initiate exponential growth until day 13. Average growth subsided at day 29, when an average maximum yield of 72.0 mg/m^2 was attained on the slides.

Maximum rates of algal growth and maximum yields were greater at the mouths of the canals than at the ends (Figures 96 and 97). At Canal II, average maximum yields were considerably greater than at Canal I when comparing equivalent station locations of the canals.

Greater maximum yields at the mouth of each canal may be the result of exposure to greater accumulative loads of nutrient and greater tidal velocities at the seaward end of the canals.

Additional inorganic nutrient loading of Canal II from auxiliary sources and rapid remineralization of organic matter (animal proteins, etc.) to greater concentrations of inorganic nitrogen (Table VII) have resulted in greater yields of periphytic algae in Canal II. These growths of algae could become a nuisance problem if continually exposed to increased nutrient loads, especially during summer conditions when plant activity is greatest.

Periphyton reflect the quality of water continuously flowing over them; therefore, they can serve as an excellent historical indicator of water quality. Changes may range from subtle alteration of species composition to complete community destruction or excessive proliferation. The nature and severity of water quality degradation are reflected in the ratio of biomass (AFW) to chlorophyll a which is considered an autotrophic index (AI). Periphyton communities exposed to inorganically enriched waters have AI's similar to those reported for algal cultures (76). As the level of non-toxic organic matter increases, the algae are replaced by non-chlorophyllous organisms resulting in an increase in the AI.

Variances in the index values at day 4 (Figures 98 and 99, Appendix E-3.5) were presumably due to different rates of attachment, adjustment, and types of organisms initially colonizing the slides. Extreme AI variances near the end of the incubation period were attributed to extensive filamentous growths of green algae and uneven distribution of animals among replicate slides.

The low AI's of Canal II reflect the response of the organism to inorganic nutrient enrichment. From days 6 through 29, at the time of exponential growth and when average maximum algal yields were attained on the slides, the average AI ranged from 39 to 182 at the mouth and from 134 to 242 at the end of Canal II (Appendix E-3.5). At the 95-percent confidence interval, no significant minimum AI differences were discerned among stations in Canal II. The average minimum AI at the mouth of Canal II was considerably less than the minimum AI at the end of the canal. This subtle difference in minimum average AI's plus the greater maximum periphyton yield at the mouth of Canal II further verifies that more inorganic and simple organic nutrients are available for periphyton growth at the mouth of the canals.

Minimum average autotrophic index (AI) values after 10 days' growth at reference Station 4 were within the range of values at other stations (Appendix E-3.5). The low AI and presence of Ulva and Enteromorpha near Station 4 indicate inorganic nutrient enrichment conditions do exist in the Punta Gorda area.

Generally, the periphyton community was reacting to inorganic nutrient enrichment in the Punta Gorda area. The data (Table VII) indicate only slight amounts of non-toxic organic matter were available to the periphyton community for growth. Apparently, organic pollution was minimal. Weber and McFarland (76) consider systems moderately polluted when the autotrophic index is approximately 1,000. Average indices at Punta Gorda stations studies from day 6 to day 29 were considerably less than 1,000 during the incubation period.

4. Phytoplankton chlorophyll a

Chlorophyll a concentrations, which are an indirect measurement of phytoplankton standing crop, were not significantly different (at 95-percent confidence interval) among the stations in each canal studied (Figure 100 and Appendix E-4.1) except in Canal I, where Stations 2 and 3 were significantly different.

In the Big Pine Key study area, significant chlorophyll a differences (at 95-percent confidence interval) did exist in 1973 among Canal III, reference Station 11, and Canal IV (Figure 100). Greater chlorophyll a concentrations in Canal IV appeared to be a subtle indication of enrichment in the nutrient-poor waters of the Big Pine Key.

Average chlorophyll a concentrations at Punta Gorda ranged from 5 to 16 mg/m^3 which are somewhat less than average concentrations of 17 mg/m^3 found in Gulf inshore waters (77). At Big Pine Key in 1973, the significantly lower average chlorophyll a concentrations ranged from 0.16 to 1.02 mg/m^3 and were comparable to or greater than average concentrations of 0.2 mg/m^3 reported from the open Gulf of Mexico (77). In 1974, average chlorophyll a concentrations at Canal II and control Station II were slightly less than open Gulf concentrations (Table XXXIX). At Canal IV, average chlorophyll a concentrations were slightly greater than open Gulf Waters.

Based on the data and observations made at the study sites, it appears that Punta Gorda's canal system is a detrital-based system.

Table XXXVII. Macrophyte biomass, Big Pine Key, Florida, November 1973.

CANAL	STATION	Ash-free weight (G/M^2) MEAN	 S
III	8	14.39	10.68
III	9	6.62	6.81
III	10	14.13	4.97
Reference	11	21.02	19.03
IV	12	17.04	14.47
IV	13	30.24	21.82
IV	14	34.94	19.34

CANAL	STATION	Dry weight (G/M^2) MEAN	 S
III	8	30.42	18.27
III	9	11.82	5.91
III	10	27.34	18.99
Reference	11	51.91	46.14
IV	12	35.38	30.80
IV	13	91.46	79.88
IV	14	81.68	45.12

S = standard deviation

Table XXXVIII. Macrophyte biomass, Big Pine Key, Florida, August, 1974.

Canal	Station	Ash-Free Weight (g/m^2) Mean	Ash-Free Weight (g/m^2) Standard Deviation	Dry Weight (g/m^2) Mean	Dry Weight (g/m^2) Standard Deviation
III	8	11.69	5.23	10.68	12.84
III	10	9.18	4.66	5.50	5.02
IV	12	0.86	0.34	0.89	0.40
IV	14	9.12	5.98	8.39	7.10

Table XXXIX. Phytoplankton chlorophyll a concentrations (mg/m^3) at mid-depth in Big Pine Key Canals, August 1974.

Replicate	Canal III		Control Canal	Canal IV				
	Station		Station	Station			Station	
	8	9	11	12	13	14	F	G
1	0.15	0.14	0.15	0.40	0.40	0.30	0.40	0.50
2	0.12	0.14	0.10	0.09	0.30		0.90	0.50
3			0.09					
$\overline{X}$	0.14		0.11		0.30		0.65	0.50

FIGURE 94
MACROPHYTE BIOMASS
BIG PINE KEY, FLORIDA
NOVEMBER, 1973

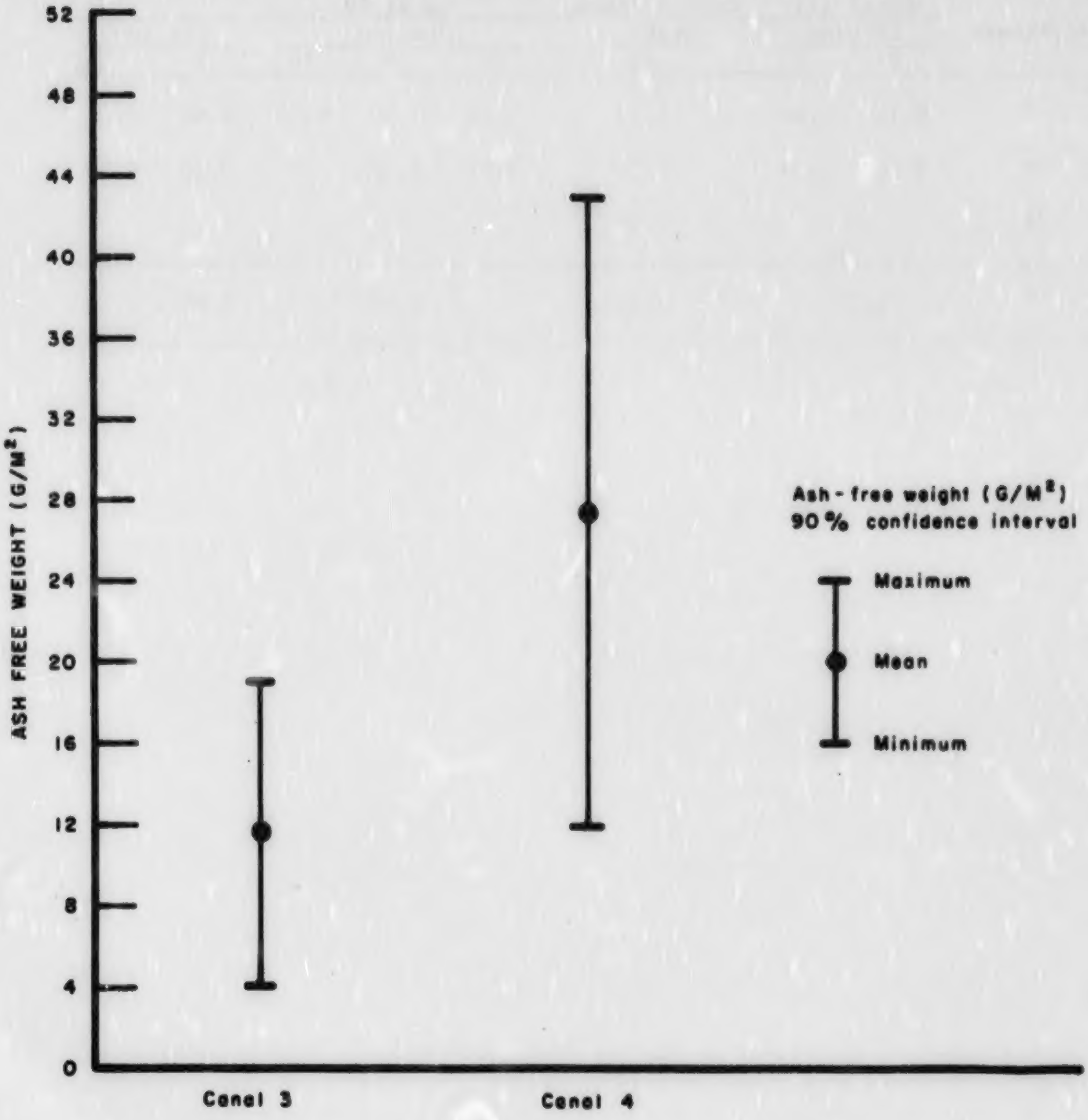


FIGURE 95
MACROPHYTE BIOMASS
BIG PINE KEY, FLORIDA
AUGUST, 1974

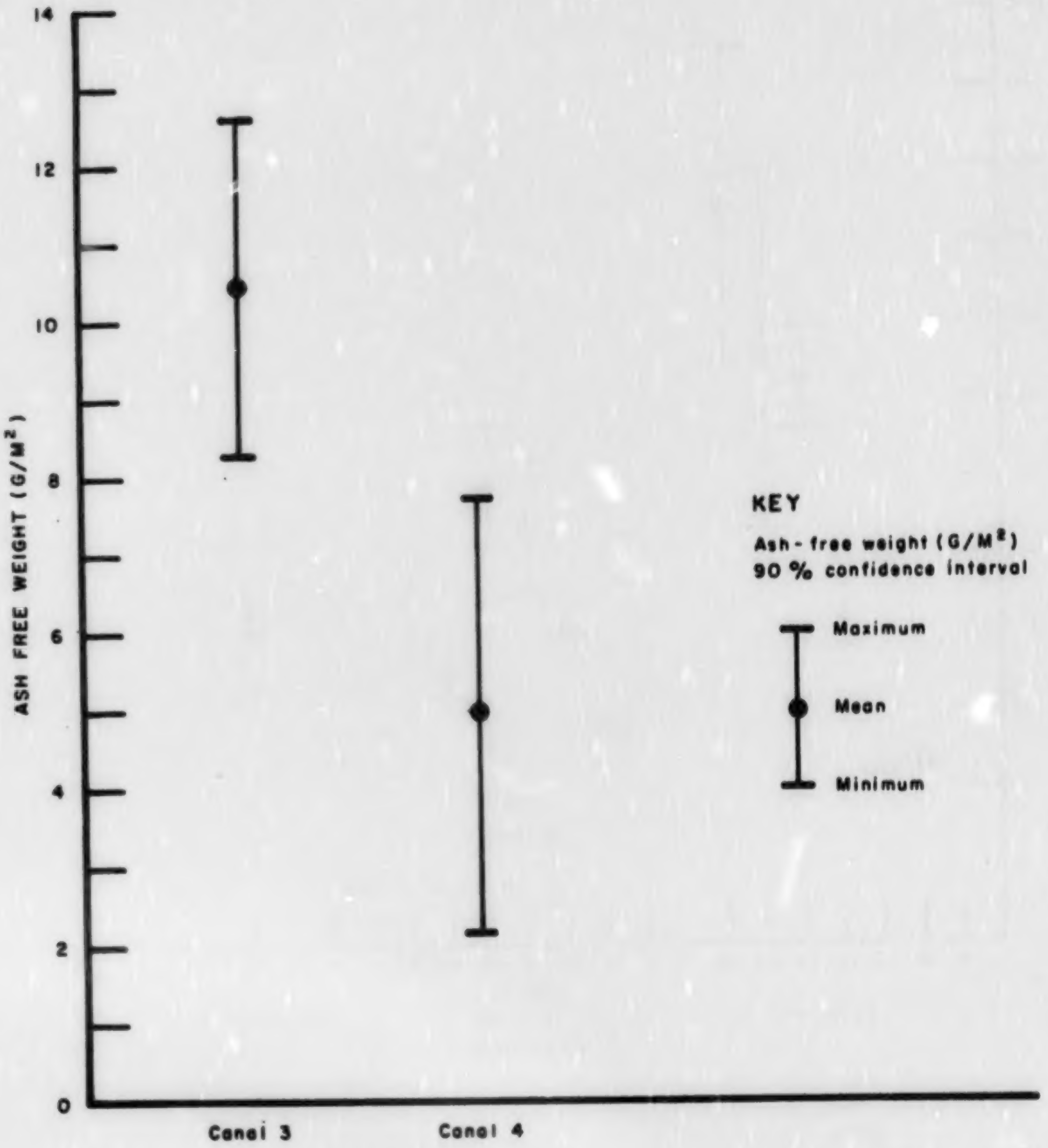


FIGURE 96
PERIPHYTON CHLOROPHYLL a (mg/m^2) FOR CANAL II
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

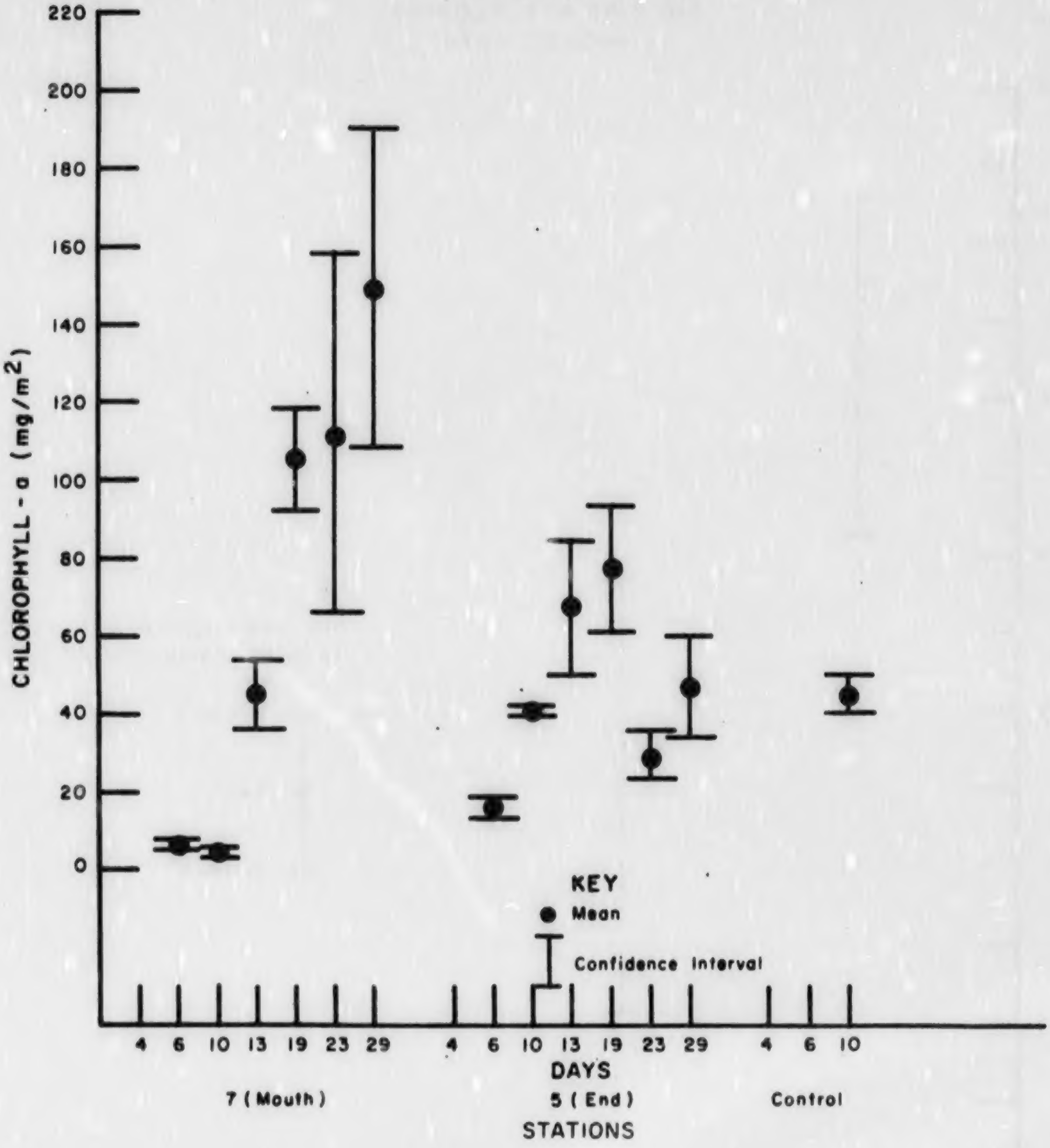


FIGURE 97
PERIPHYTON CHLOROPHYLL a (mg/m²) FOR CANAL I
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

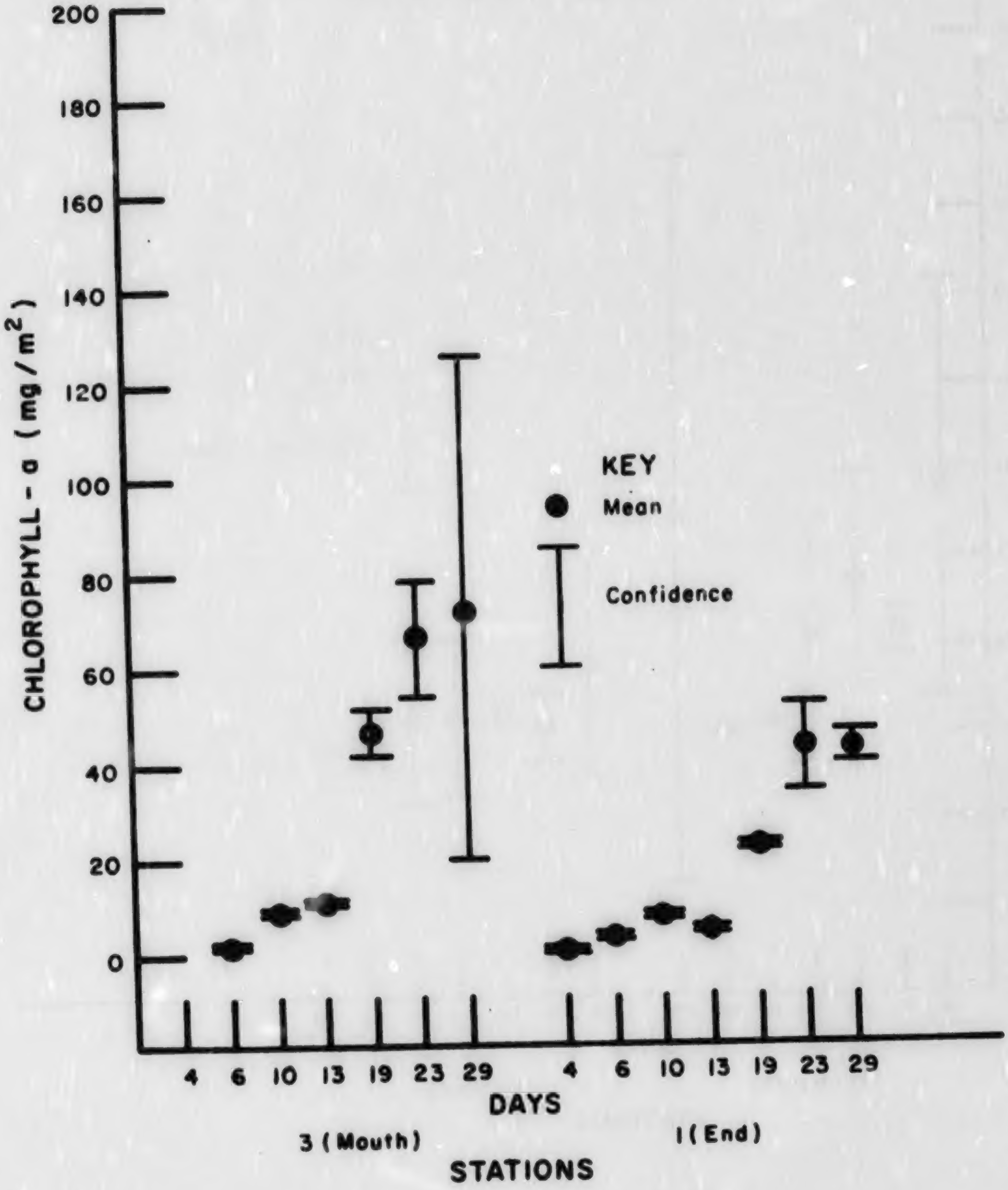


FIGURE 98
PERIPHYTON AUTOTROPHIC INDEX FOR CANAL I
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

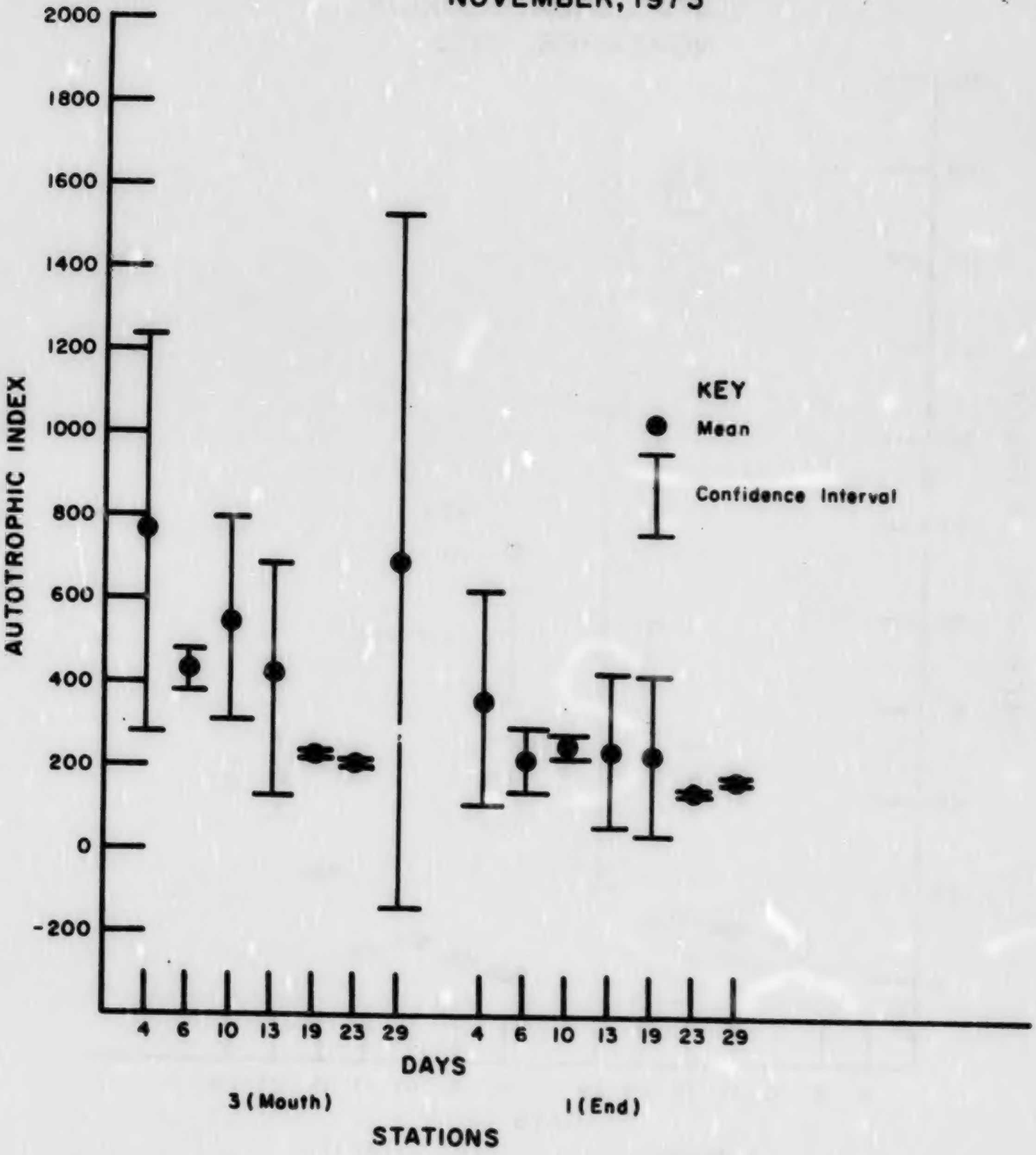


FIGURE 99
PERIPHYTON AUTOTROPHIC INDEX FOR CANAL II
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

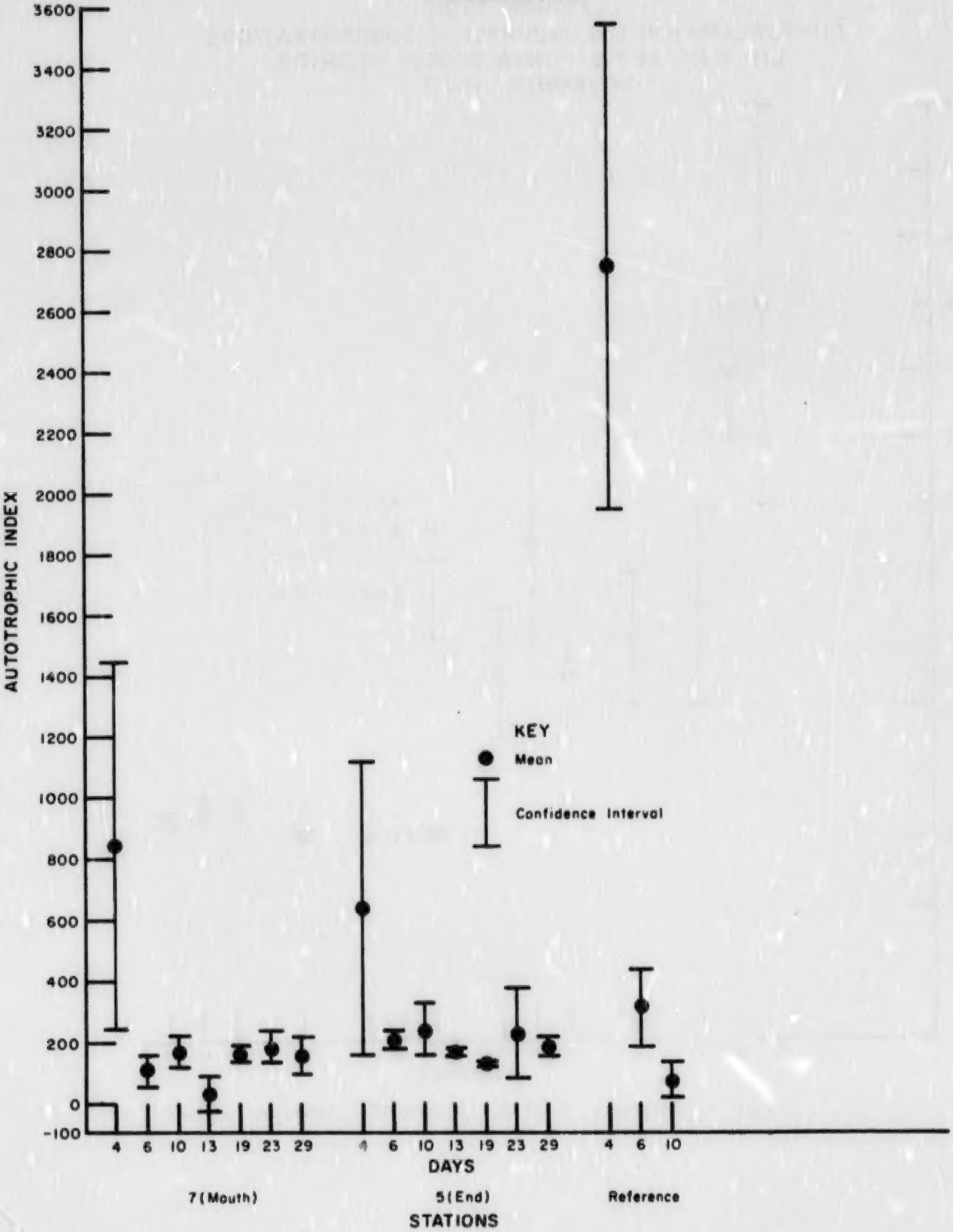
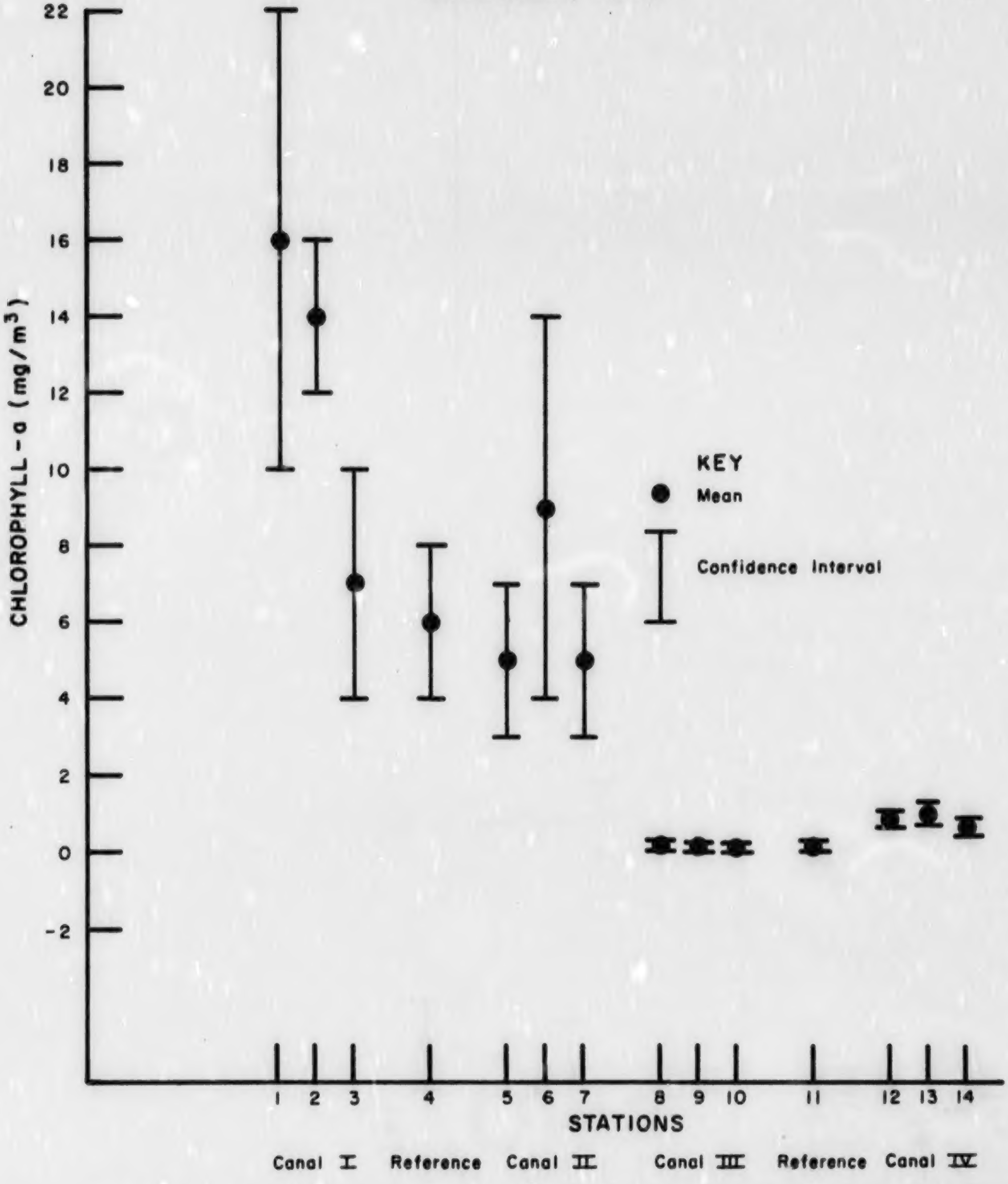


FIGURE 100
PHYTOPLANKTON CHLOROPHYLL a CONCENTRATIONS
BIG PINE KEY & PUNTA GORDA, FLORIDA
NOVEMBER, 1973



H. MATHEMATICAL MODELING

Mathematical modeling techniques were applied fo four of the study canals: Canal II at Punta Gorda, Canal V at Big Pine Key and Canals VI and VII at Atlantic Beach (Figures 101, 102 & 103). The models were calibrated by simulating the fate of a dye and comparing the simulations with field measurements. Once calibrated, the models were used to compute flushing rates and also to compute dissolved oxygen suppressions under hypothetical waste loadings.

1. Models

The model used for initial simulations of the canals was the June 1973 University of Florida version of the Storm Water Management Model (SWMM). The University of Florida has an ongoing contact with EPA to maintain the "official" version of SWMM and to revise and update both the source code and documentation for the entire SWMM package (78 and 79).

SWMM did not satisfactorily reproduce observed profiles. The field study showed the dye mixing rapidly throughout the length of the canal and then slowly "bleeding" out. The model, however, shows the dye cloud centroid remaining in one place and slowly flattening out, similar to classical diffusion without advection. As the SWMM neglects diffusion in its transport equation, this apparent diffusion is probably due to "numerical dispersion", or "pseudo-dispersion", associated with the numerical methods employed in this model.

2. Model Background

The omission of diffusion in SWMM seems to be a serious oversight but this phenomenon was neglected only after several applications of the model showed it to be relatively insensitive to the diffusion coefficient. The conceptual development and initial application of the model to San Francisco Bay was carried out by Water Resources Engineers (WRE) of Walnut Creek, California. This model was documented in a user-oriented form by Feigner and Harris in 1970 (80) and the model was called the Dynamic Estuary Model (DEM). A concurrent application of this model to the Columbia River was described by Callaway et al. in 1969 (81) and further documentation of this version followed in 1970 (82). This version is the Columbia River Model (CRM). An application to the Potomac Estuary and comparison with the "Thomann" one-dimensional, steady-state model was described by Clark and Feigner in 1972 (83). This report describes a detailed sensitivity analysis of the model and concludes that:

> "Of the various input parameters investigated for the Dynamic Estuary Model, the decay rate and solution technique for advective transport appeared to be the most sensitive in affecting the model's predictions. With the exception of simulating salinity (chlorides) the least sensitivity was identified with the dispersion (diffusion) coefficient."

All of the above applications used the basic model which was developed by WRE for San Francisco Bay. WRE also continued use of the model and eventually modified it to accept hydrograph inputs for use as the receiving waters model of SWMM. In the SWMM final report, the following statement regarding diffusion is made:

> "Experience has shown that, with the short computational time intervals used, the major transport mechanism is by advection and thus the diffusion term can be safely neglected."

The SWMM model has had wide application in water quality modeling. In a series of river basin modeling contracts, the Chattahoochee River, Pearl Harbor, the Willamette River Basin, and several New England basins were modeled. Region IV, EPA had used the model almost exclusively as an estuary model, the only exception being an application to the Chattahoochee River. Among the estuaries modeled have been the Escatawpa Estuary, Bayou Cassotte (both near Pascagoula, Mississippi), Biloxi Back Bay (Biloxi, Mississippi), the Mobile River at Mobile, Alabama and the Sampit River and Winyah Bay (Georgetown, South Carolina). The model has performed quite well in these applications; its only serious deficiency has been the inability to simulate vertical stratification. This limitation is inherent in the assumptions made in model development.

However, the SWMM model does not perform satisfactorily in finger-fill canal systems and it was suspected that the reason for this failure is the omission of the diffusion term in the mass transport expression. As canal systems have little natural inflow, the net advective transport is small and the major transport mechanism is diffusion. The models mentioned in the previous paragraph were of systems where advective transport was large compared to diffusion.

The importance of diffusion in the canal systems was tested by using a pre-SWMM version of the WRE model which had a diffusion term in the transport equation - the CRM or Callaway version of the original WRE model. This version was selected because of its availability and excellent documentation. It was selected over the DEM version because CRM has a temperature simulation capability which DEM does not have. While this feature was not exercised in this application, it was felt that experience with this version might be useful in the future.

3. Simulations

Once the CRM was selected, the problem of choosing a proper diffusion constant arose. CRM (and DEM) uses the following time variant expression for diffusion:

$$D_L = c/u/R \qquad \text{(Eq- 9)}$$

Where:

D_L = dispersion coefficient in sq. ft/sec

$/u/$ = tidal velocity in ft/sec

R = "Hydraulic Radius"[1] expressed as:

$$\frac{\text{Channel Cross Sectional Area}}{\text{Width}}$$

c = Dispersion constant - dimensionless

Note:[1] the expression for the hydraulic radius differs from the classical definition

As seen from the above, D_L is dependent upon canal depth, width, length, tidal amplitude, and tidal period.

Simulations performed on the canals using the above computation for the dispersion constants derived from the field measured D_L values (Table II) were found to be inadequate. The dispersion constants were too small. However, further simulations did produce an equation that approximated the field measured concentrations, i.e., $D_L = 0.22\ c/u/R$ (Eq- 10).

Table XL

Canal	Location	D_L*	c
II	Punta Gorda	1.3 sq. ft./sec.	180
V	Big Pine Key	0.7 sq. ft./sec.	120
VI	Atlantic Beach	2.3 sq. ft./sec.	180
VII	Atlantic Beach	3.7 sq. ft./sec.	180

*field measured

The dye tracer Rhodamine WT Dye is not a truly conservative tracer. Feurstein and Selleck (9) reported a decay coefficient for Rhodamine dye subjected to bright sunlight conditions to be - 0.538 per day (i.e., C/C_o = exp (-.0538/day)). Their work, however, did not quantify the solar energy required to produce this decay rate. Since our flushing studies required a mass balance of the tracer material, an accounting for the decay rate of the tracer along with measurements of light energy (to relate decay rate to solar energy) was carried out during the September 1974 study. Decay coefficients for the November 1973 flushing studies are those reported above (-0.538 per day) adjusted for light penetration.

Clear glass bottles containing known concentrations of the tracer were submerged at mid-depth in one of the investigated canals at Atlantic Beach, North Carolina. Aliquots were taken from these bottles at selected intervals throughout the study and subjected to fluorescence measurement. In conjunction with the bottle decay measurements, light penetration and solar energy determinations were made to develop quantitative relationships between decay rates and solar energy.

A marine photometer unit was employed to measure the light intensity at the waters surface and also at the mid-water column elevation. Solar intensities at mid-depth were found to be approximately 20% of the surface intensity. These readings along with pryheliometer solar energy recordings supplied by the National Marine Fisheries Office in Beaufort, North Carolina, were then used to describe the photochemical reaction rate of the tracer material (Figure 104).

After exposure to 308,000 microeinsteins per meter squared of light energy with a wave length of 590 nanometers (the excitation length of the tracer) the tracer had decayed 1% (Figure 104). The decay coefficient (mid-depth) was found to be -0.1278 per day. This equates to a full light (water surface) decay coefficient of -0.534 per day which agrees well with the value reported by Feurstein and Selleck (-0.538 per day). In terms of 1/2 life, the tracer dispersed in the water column decayed due to photochemical reactivity to 50% of the original concentration in 130 hours.

Coefficients used in the mathematical simulations were -0.009, -0.013 and -0.005 per hour for Punta Gorda, Big Pine Key and Atlantic Beach, respectively. Comparisons between computed and field measured tracer concentrations reveal a reasonable verification of the applicability of this model (Figures 105, 106, 107 and 108).

Successful verification of the modeling technique was followed by a hypothetical simulation of a conservative pollutant to illustrate the flushing times of the three canal systems. Point source loads were placed at the canal dead-ends. Resulting flushing times for a 50% reduction of the conservative contaminant are 51, 70, 22 and 49 hours in Canals II, V, VI, and VII, respectively. Likewise, a 90% reduction occurs in Canal II at 165 hours, Canal V at 220 hours, Canal VI at 70 hours and Canal VII at 146 hours (Figure 109).

Canals II and V were also tested for dissolved oxygen effects under the influence of waste loadings from hypothetical sewage treatment plants. Simulations were made for a 10,000 gallon per day (gpd) and a 100,000 gpd waste discharge near the dead end of each canal. Carbonaceous oxygen demand (BOD_5) of 20 ppm, nitrogenous oxygen demand (TKN) of 20 ppm, and a dissolved oxygen concentration of 1.0 mg/l were assumed in the effluent. Reaeration and deoxygenation rates used were 0.05 and 0.10 per day (base e), respectively.

Dissolved oxygen suppressions resulting from the above loadings are shown on Figures 110 and 111. These computed DO changes do not reflect other associated DO demand such as sediment demands, metabolic respiration, and imported carbonaceous and nitrogenous demands. The effect on the DO budget at the dead end of Canal II (Punta Gorda) was a 0.26 mg/l and a 2.6 mg/l decrease due to the respective waste loads of 10,000 gpd and 100,000 gpd. Waste loadings to Canal V at Big Pine Key were more pronounced. The DO suppressions at the dead end were 0.60 mg/l and 4.2 mg/l for the respective waste discharges.

One must keep in mind that greater benthic demands and increased plant metabolism would be associated with the introduction of these waste loads to the canal system and would produce added stresses on the DO budget.

The quantitative effect of the simulated waste loading to Canal II can be approximated by assuming that this canal, if it had no development along its banks, would have DO concentrations typified by those recorded in Canal I (undeveloped). This comparison is given in Table XLI but, again, accelerated plant growth, benthic demands, and runoff are not considered.

TABLE XLI

Typical DO's in Canal II Under Waste Loadings
Punta Gorda, Florida, November 1973

Canal Location	Canal Avg. DO			Computed Suppression		Canal II DO					
				10,000 GPD	100,000 GPD	10,000 GPD			100,000 GPD		
	Max	Min	Avg			Max	Min	Avg	Max	Min	Avg
Dead End	6.6	4.9	5.7	0.26	2.6	6.3	4.6	5.4	4.0	2.3	3.1
Mid-Length	6.3	5.1	5.7	0.06	0.56	6.2	5.0	5.6	5.7	4.5	5.1
Mouth	7.0	5.2	5.8	0.02	0.15	7.0	5.2	5.8	6.8	5.0	5.6

TABLE XLII presents a similar analysis of Canal V at Big Pine Key. In this case, the DO suppressions of Figure III were simply applied to the field measured DO in the undeveloped canal (Canal V).

TABLE XLII

Typical DO's in Canal V Under Waste Loadings
Big Pine Key, Florida, November 1973

Canal Location	Canal Avg. DO			Computed Suppression		Canal II DO					
				10,000 GPD	100,000 GPD	10,000 GPD			100,000 GPD		
	Max	Min	Avg			Max	Min	Avg	Max	Min	Avg
Dead End	6.2	5.3	5.8	0.60	4.2	5.6	4.7	5.2	2.0	1.1	1.6
Mid Length	6.2	5.3	5.8	0.20	1.70	6.0	5.1	5.6	4.5	3.6	4.1
Mouth	6.8	5.0	6.2	0.10	1.61	6.7	4.9	6.1	6.2	4.4	5.6

The discharge of sewage treatment plant effluent into these canal systems would be ill-advised. Simulated discharges indicate that even a minor waste flow of 10,000 gpd would tax the oxygen budget. Other perturbations such as increased benthic demands, respiration, runoff, and decreased DO saturation during warm weather conditions, would increase the DO deficits.

Modeling should be applicable to similar situations where canal configurations and dispersion coefficients are known. When field measurements of the dispersion coefficients are not possible, approximations of the dispersion coefficients are not possible; approximations can be made by empirical means. However, the model should be used carefully as it does not include the dispersion mechanism induced by salinity and temperature stratification.

The effects of canal dimensions, i.e., depth and length, were simulated on Canal V at Big Pine Key. Mixing mechanisms were assumed to be unchanged from the field measurements of current conditions (no stratification). Dispersive factors were simply recomputed from the 4/3 Law with subsequent dispersion constants (C) for the math model computed by Equation 10. Note that both length and depth are forcing factors in this equation.

Resulting flushing curves (Figure 112) reveal that 50% flushing of a conservative contaminant introduced near the canal dead end would occur after 90 hours, under the current configuration, after 170 hours with the length doubled, after 230 hours with the depth doubled and after 30 hours with the depth halved. Likewise, 90% flushing would occur after 220 hours, 400 hours, 660 hours, and 90 hours under the above configurations. From these flushing times (Figure 112), it is apparent that depth has a greater effect on flushing time(s) than does length. Consequently, if flushing times are to be minimized, canal depths should be governed by minimum navigation criteria and not by fill requirements for residential development. A further consideration is that increased depths may promote temperature/salinity stratification which inhibit complete mixing.

To document the flushing times in a canal system with depths of 4-6 MLW additional studies were performed in July 1975. Studies were conducted on a branching canal system at Cape Coral, Florida. This particular system had a width of 125', a fairly constant depth of 5 feet MSL, a length of 6000' and experienced a 1 foot tidal range. Resulting flushing times to the 50% and 90% levels were 50 and 170 hours respectively.

Dissolved oxygen measurements in the above system substantiated the consequences of shallower depths. All minimum DO values recorded were equal to or greater than 4.5 ppm over a 25 hour diel period. In contrast, canals of similar configurations and joining the same parent water body and with depths to 13 feet were stratified with respect to salinity. Minimum DO values of 0.0 ppm were recorded for the bottom waters in this canal system.

FIGURE 101
TRACER STUDY
PUNTA GORDA, FLORIDA
NOVEMBER, 1973

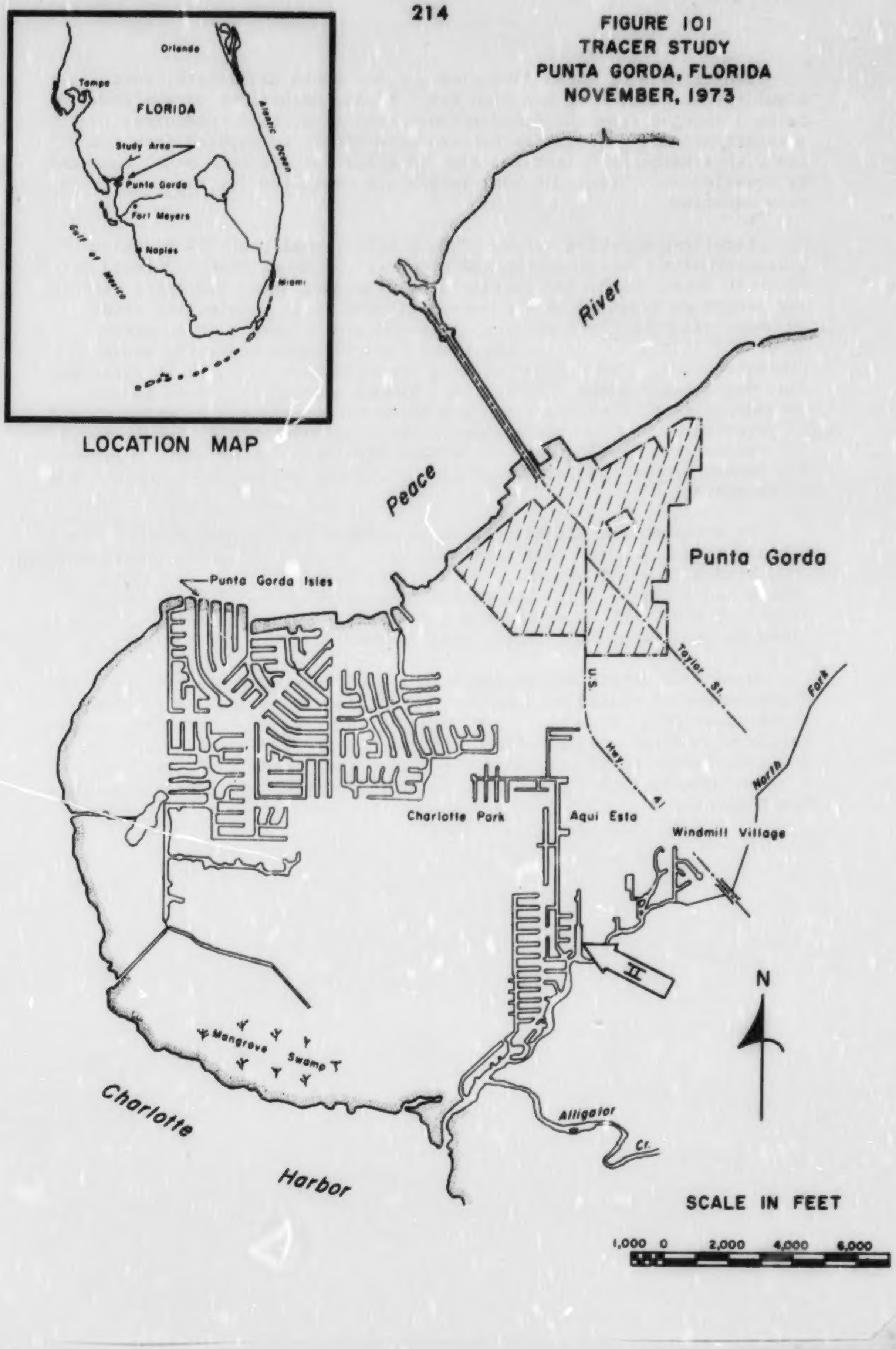

Orlando
Tampa
FLORIDA
Study Area
Punta Gorda
Fort Meyers
Naples
Miami
Gulf of Mexico
Atlantic Ocean
LOCATION MAP
River
Peace
Punta Gorda
Punta Gorda Isles
Taylor St.
U.S. Hwy. 41
North Fork
Charlotte Park
Aqui Esta
Windmill Village
II
N
Mangrove Swamp
Charlotte Harbor
Alligator Cr.
SCALE IN FEET
1,000 0 2,000 4,000 6,000

FIGURE 102
TRACER STUDIES
BIG PINE KEY
NOVEMBER, 1973

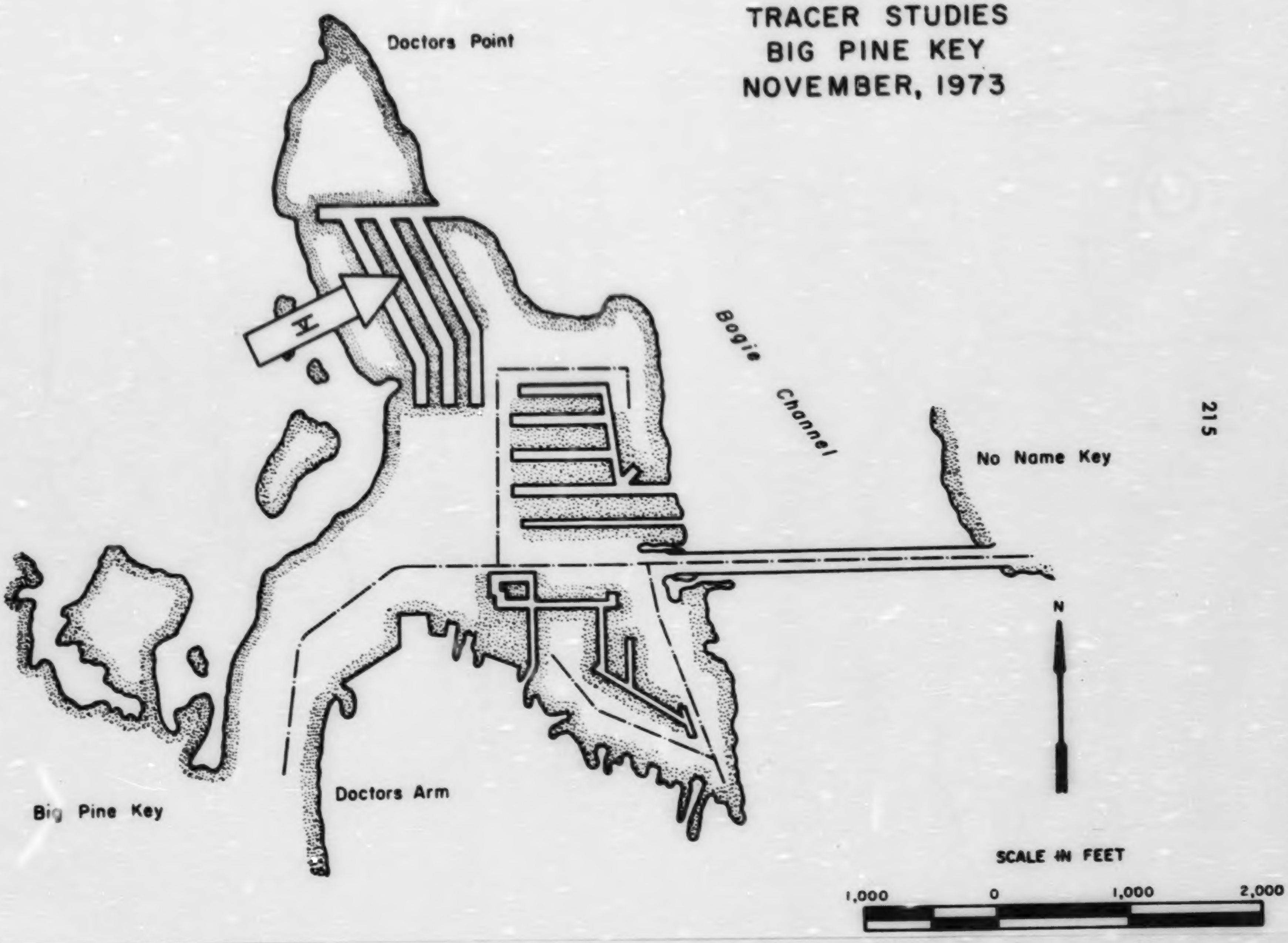

Doctors Point
Bogie Channel
No Name Key
Doctors Arm
Big Pine Key
H
N
SCALE IN FEET
1,000
0
1,000
2,000

FIGURE 103
TRACER STUDY
ATLANTIC BEACH
SEPTEMBER, 1974

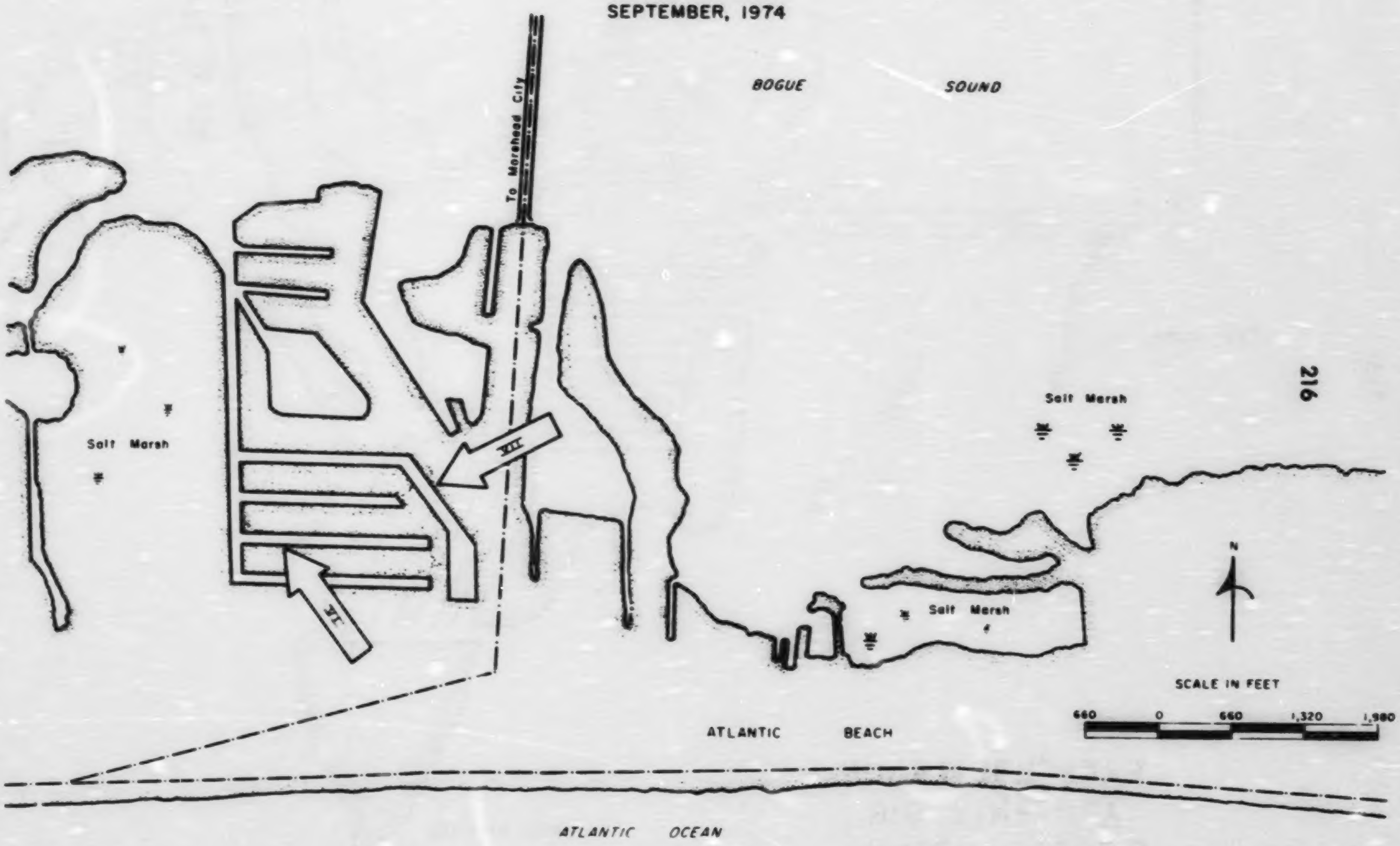
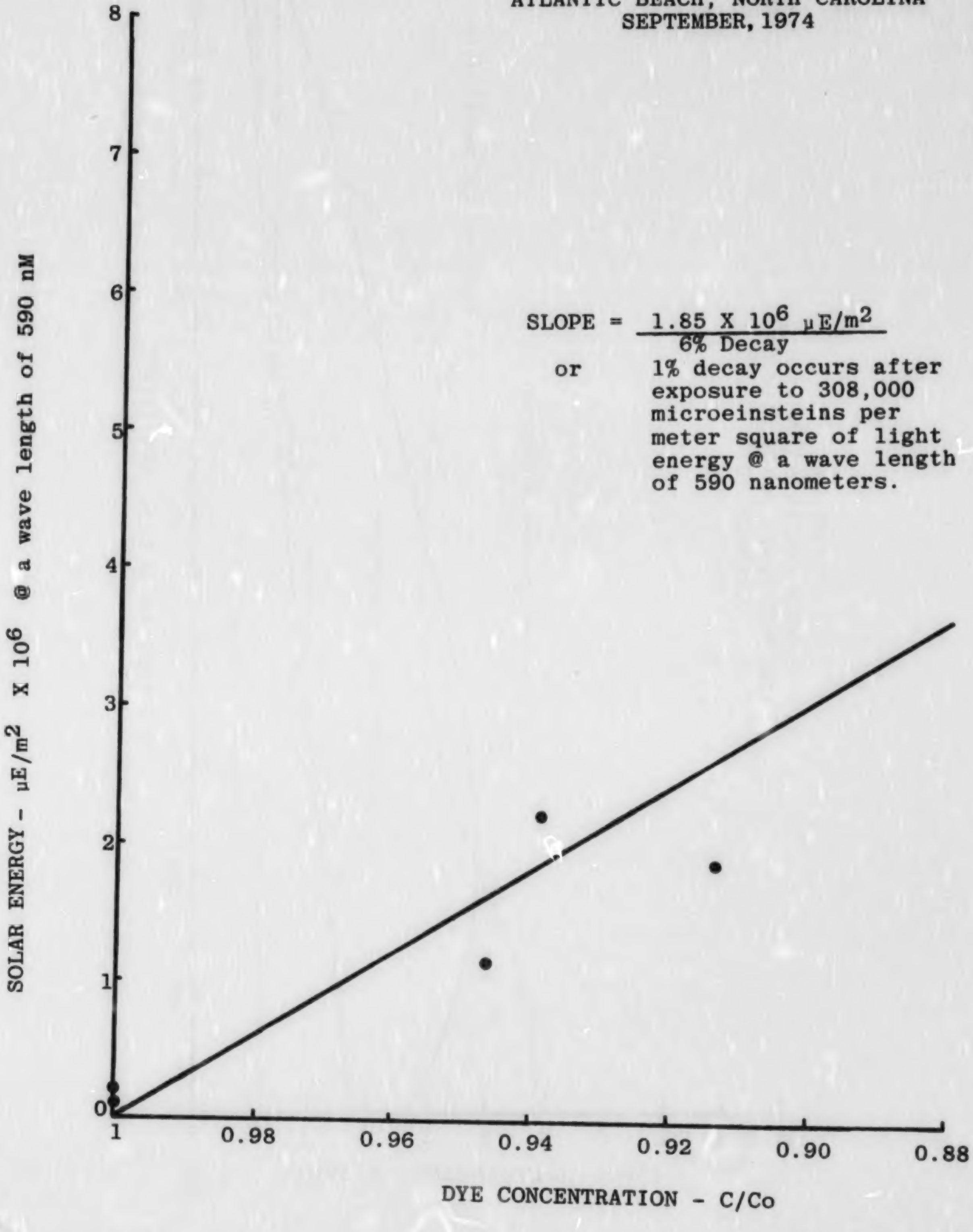

BOGUE SOUND
To Morehead City
Salt Marsh
Salt Marsh
Salt Marsh
XII
XI
N
SCALE IN FEET
660
0
660
1,320
1,980
ATLANTIC BEACH
ATLANTIC OCEAN

FIGURE 104
PHOTOCHEMICAL DECAY
RHODAMINE WT
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974


SLOPE = $\frac{1.85 \text{ X } 10^6 \ \mu E/m^2}{6\% \text{ Decay}}$

or 1% decay occurs after exposure to 308,000 microeinsteins per meter square of light energy @ a wave length of 590 nanometers.

FIGURE 105
TRACER CONCENTRATIONS
CANAL # II PUNTA GORDA, FLORIDA
NOVEMBER, 1973

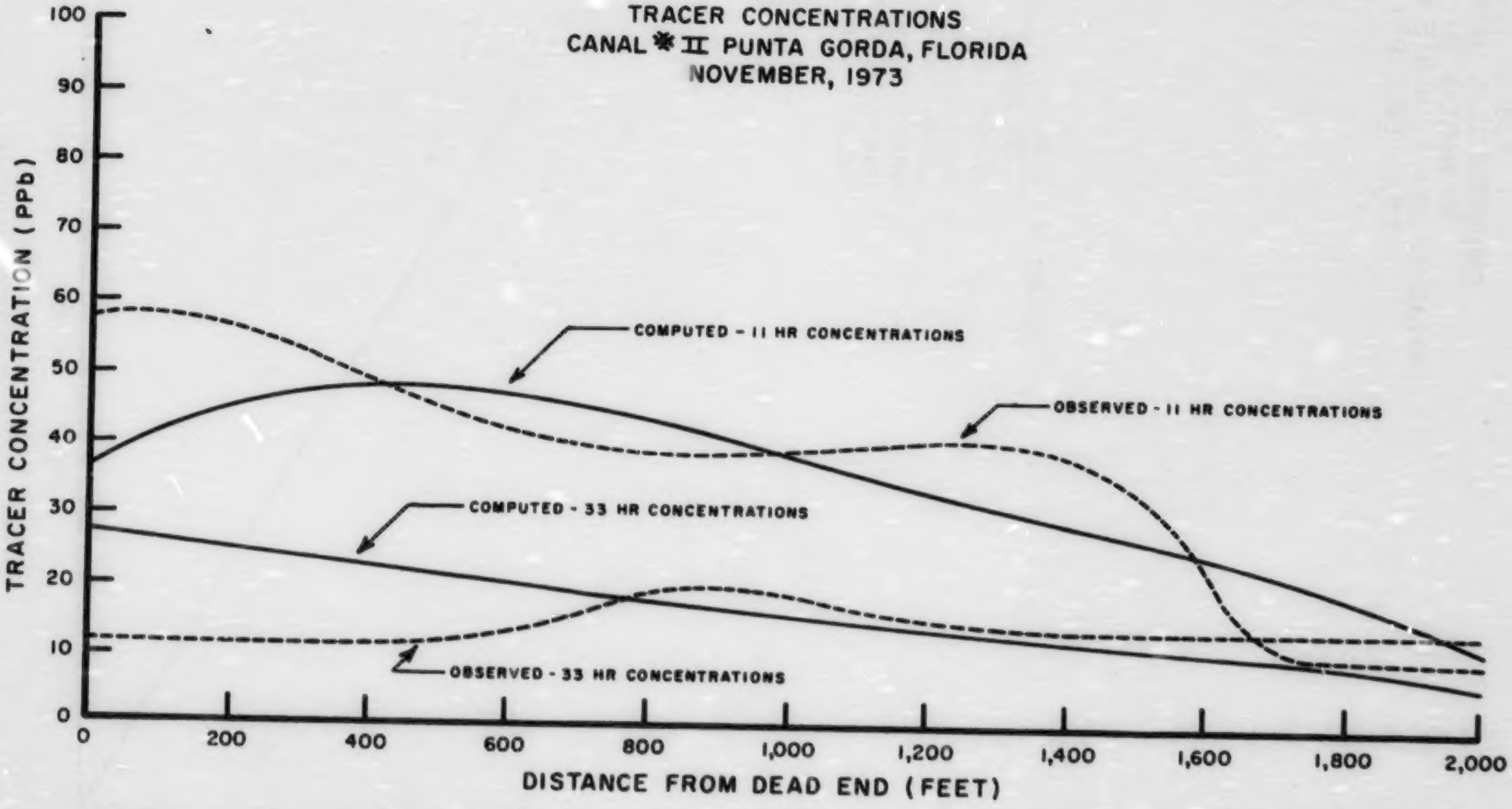
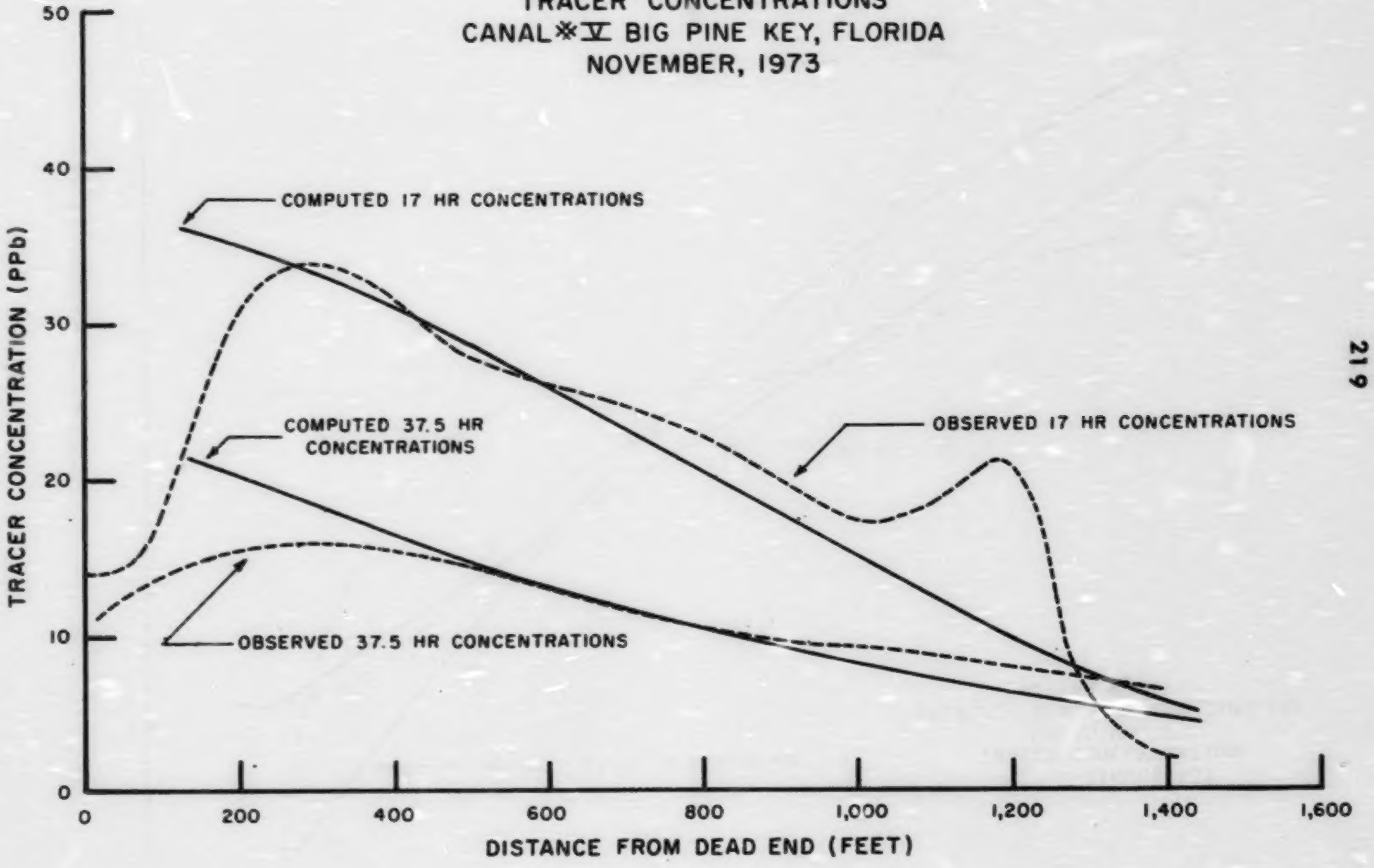


FIGURE 106
TRACER CONCENTRATIONS
CANAL ※ V BIG PINE KEY, FLORIDA
NOVEMBER, 1973



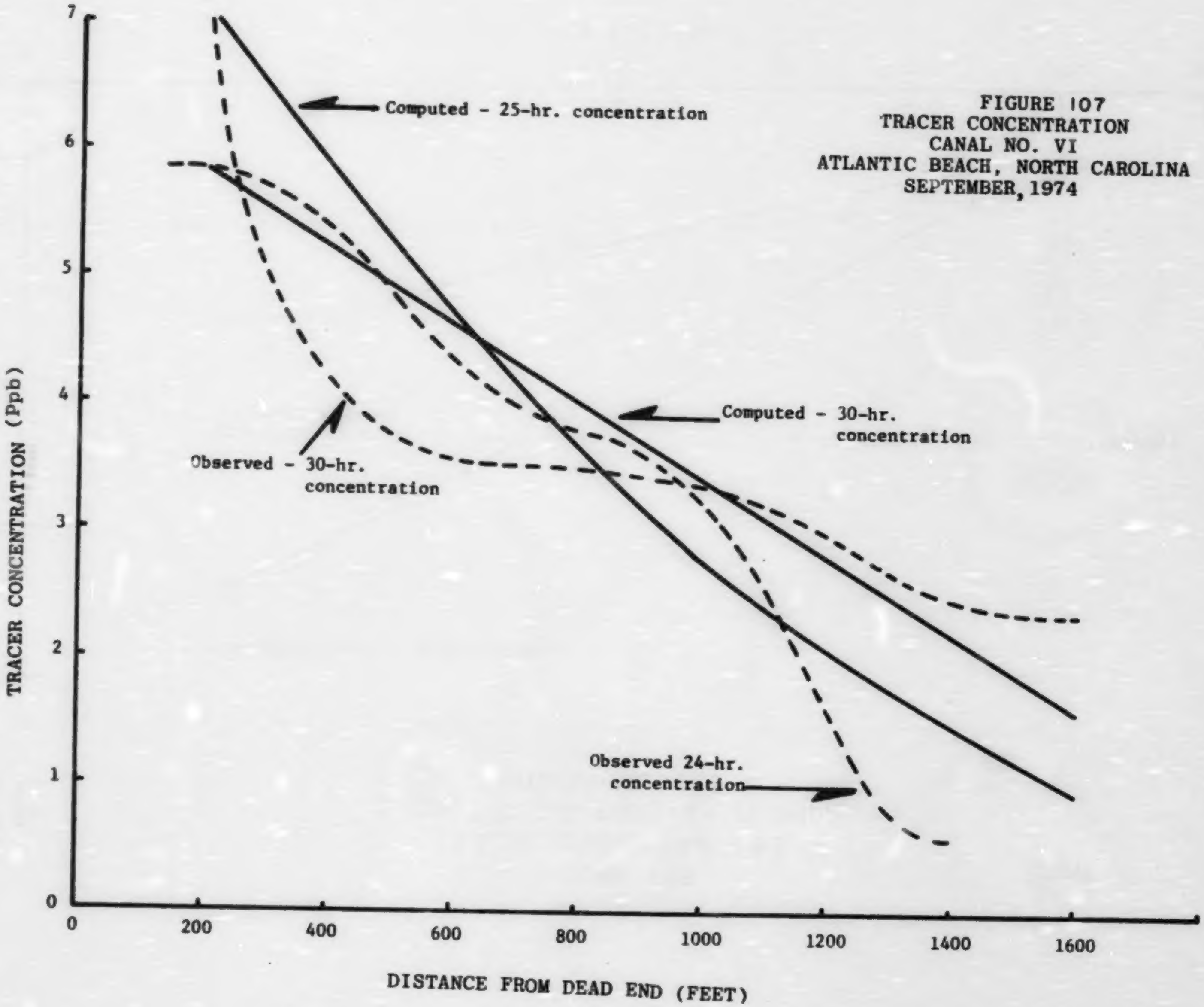


FIGURE 107
TRACER CONCENTRATION
CANAL NO. VI
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974

FIGURE 108
TRACER CONCENTRATION
CANAL #VII ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974

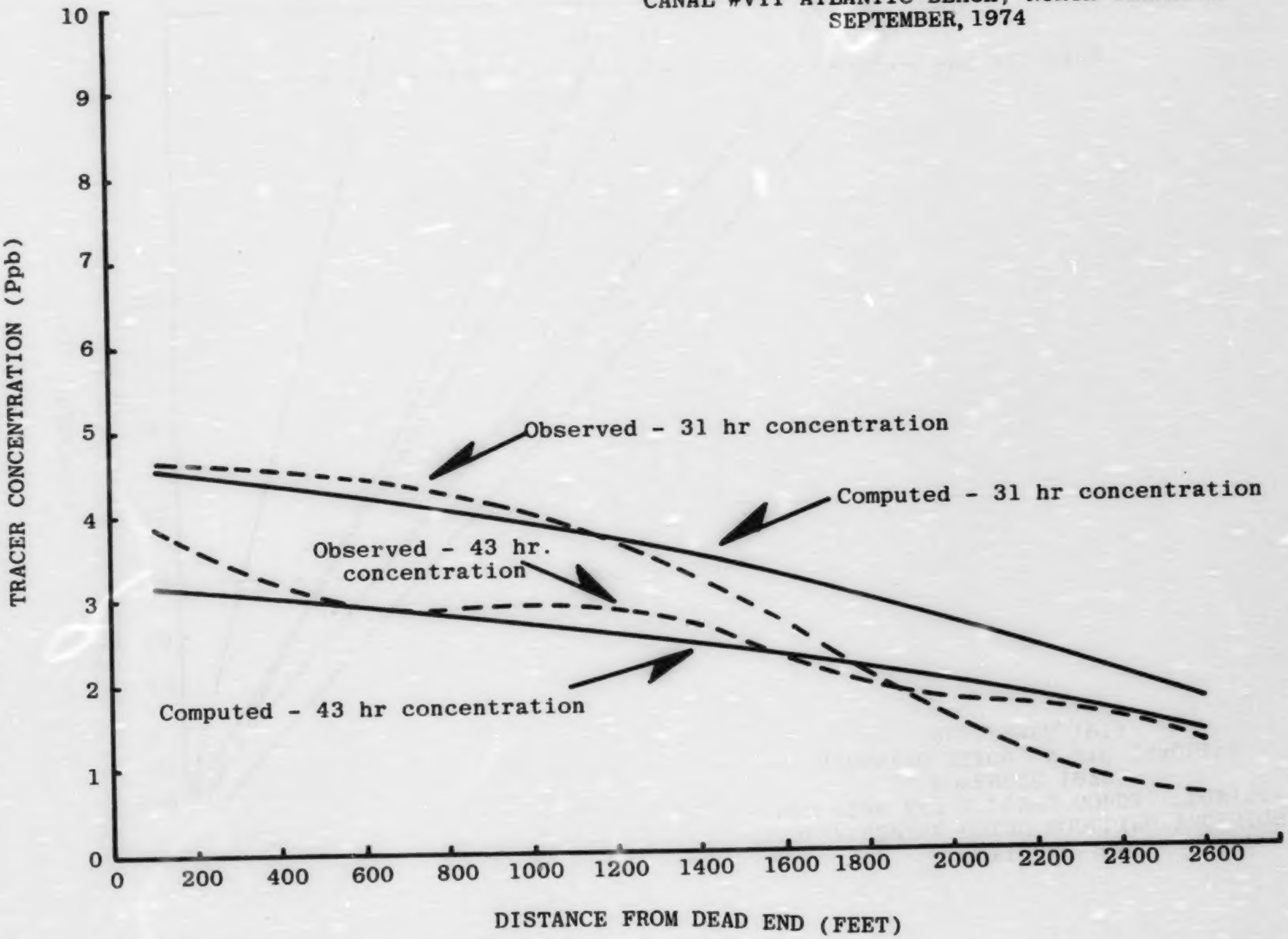


FIGURE 109
CANAL FLUSHING USING MODELING TECHNIQUE
BIG PINE KEY & PUNTA GORDA, FLORIDA
NOVEMBER 1973
ATLANTIC BEACH, NORTH CAROLINA
SEPTEMBER, 1974

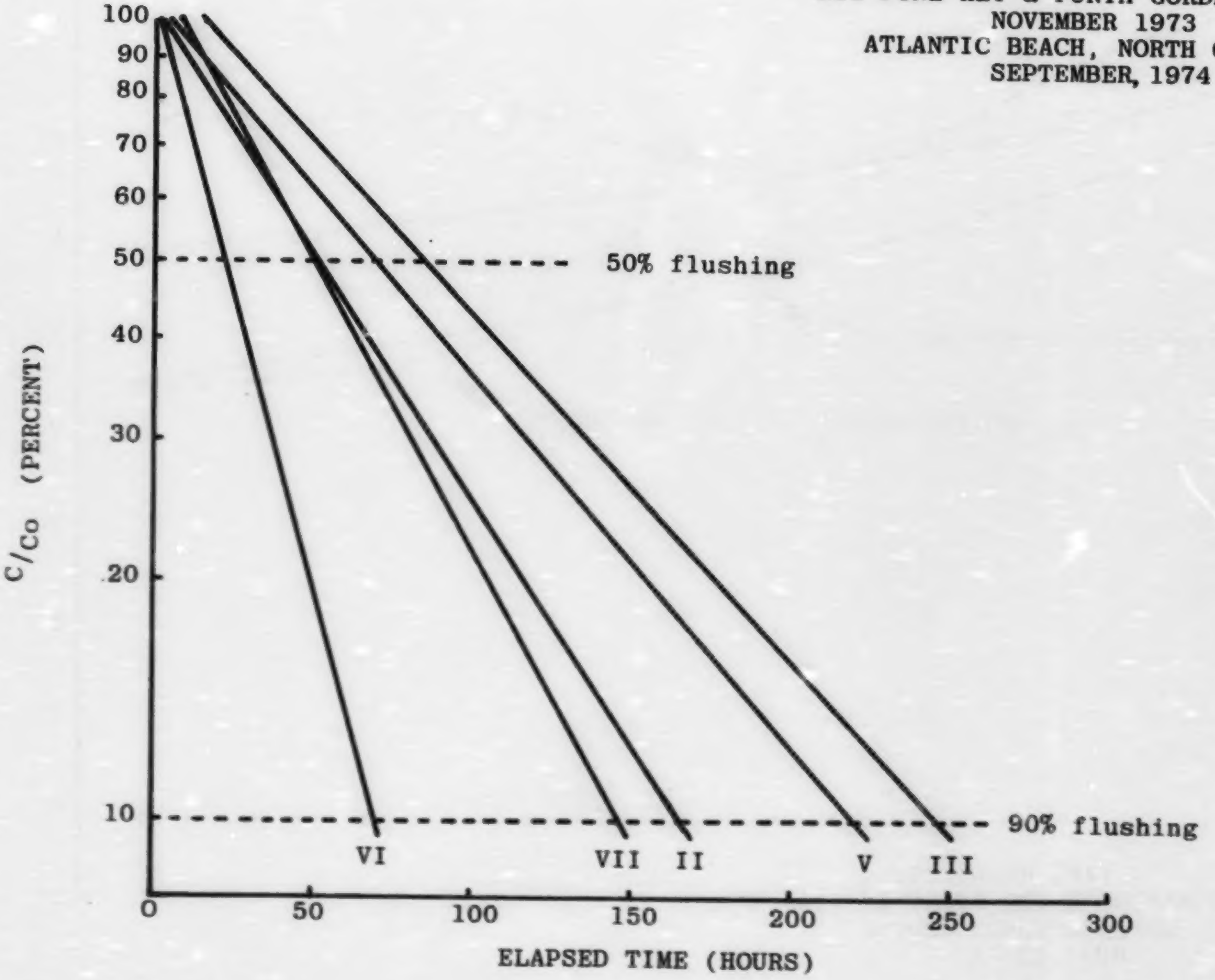
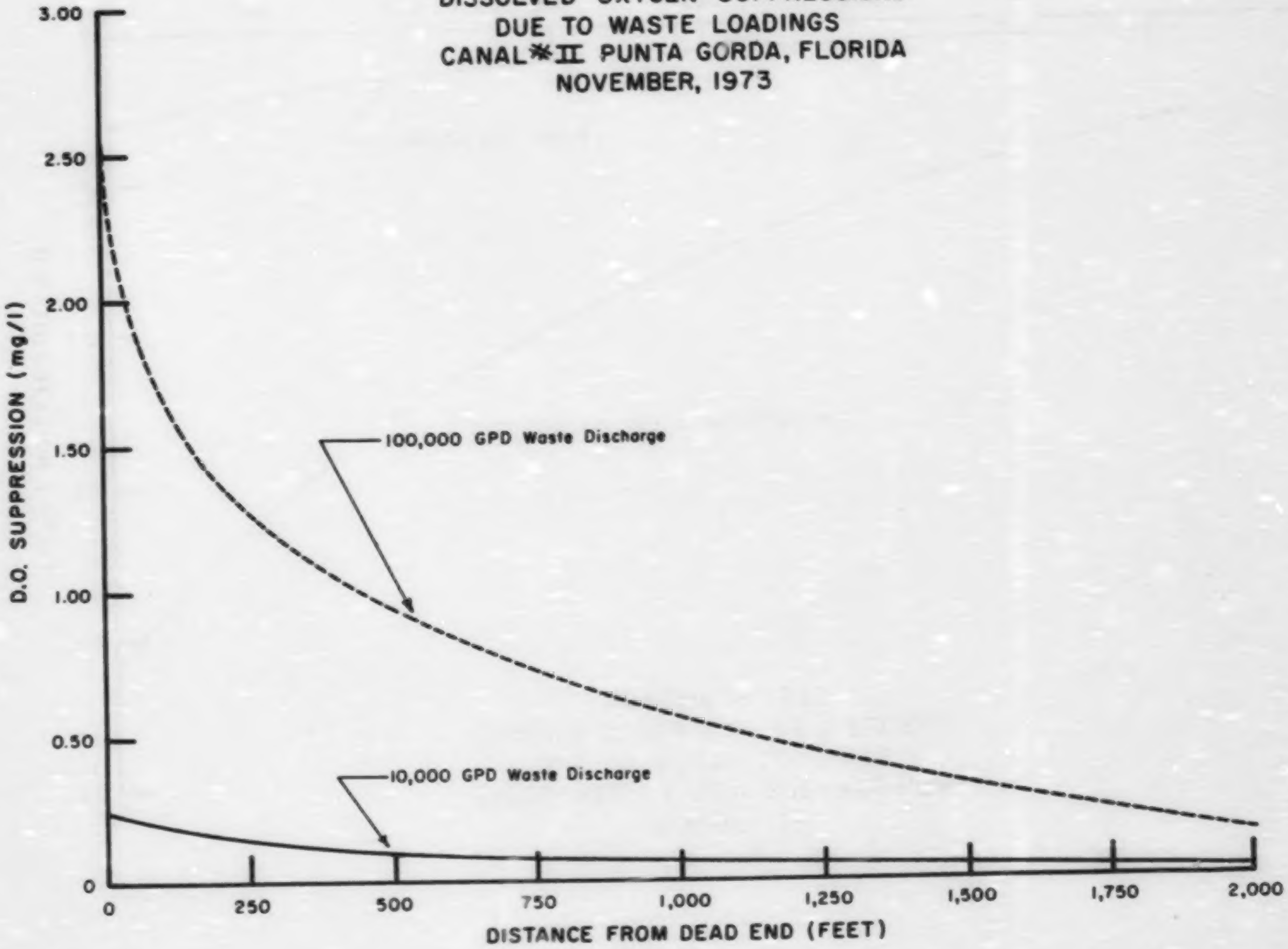


FIGURE 110
DISSOLVED OXYGEN SUPPRESSIONS
DUE TO WASTE LOADINGS
CANAL #II PUNTA GORDA, FLORIDA
NOVEMBER, 1973



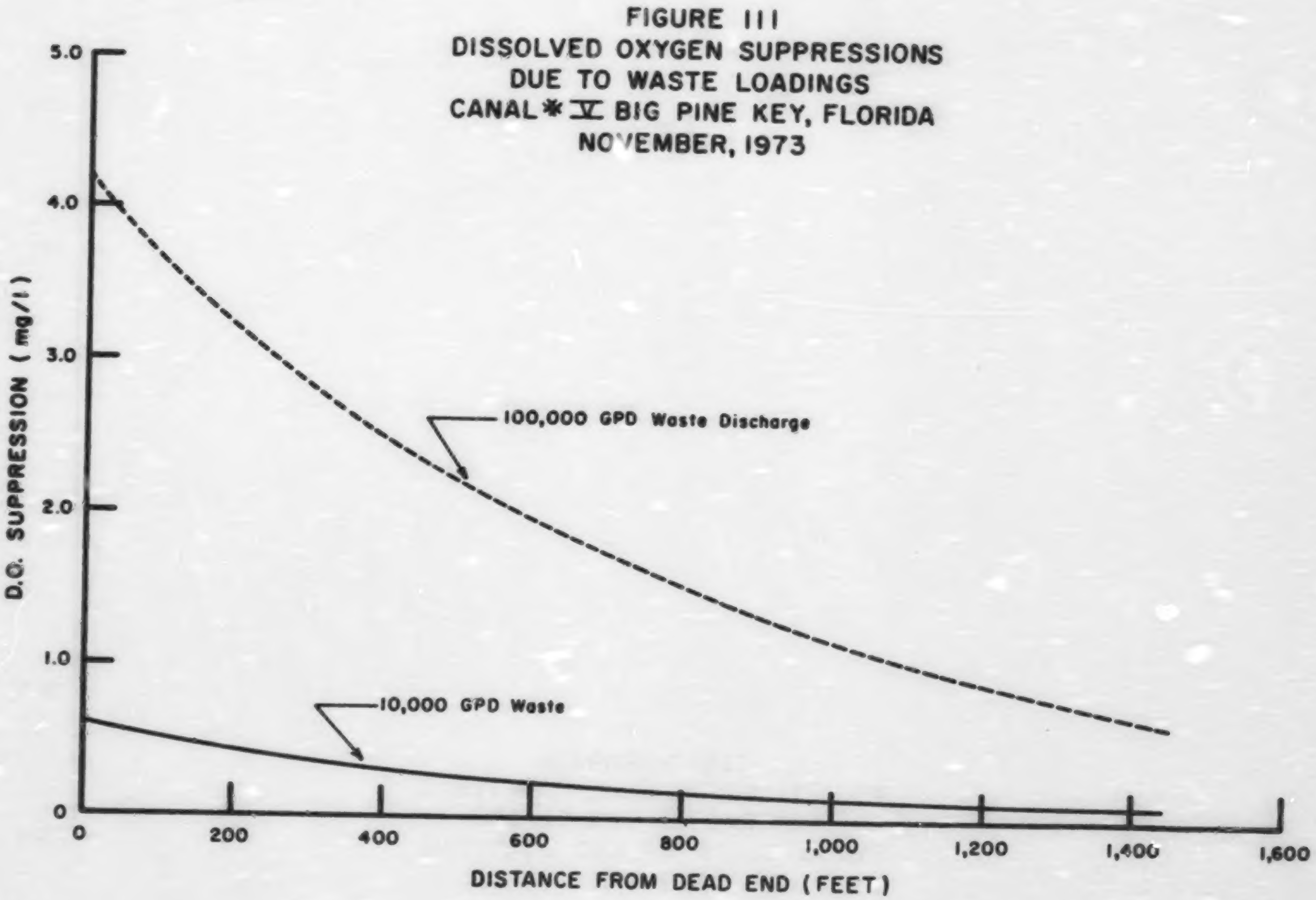
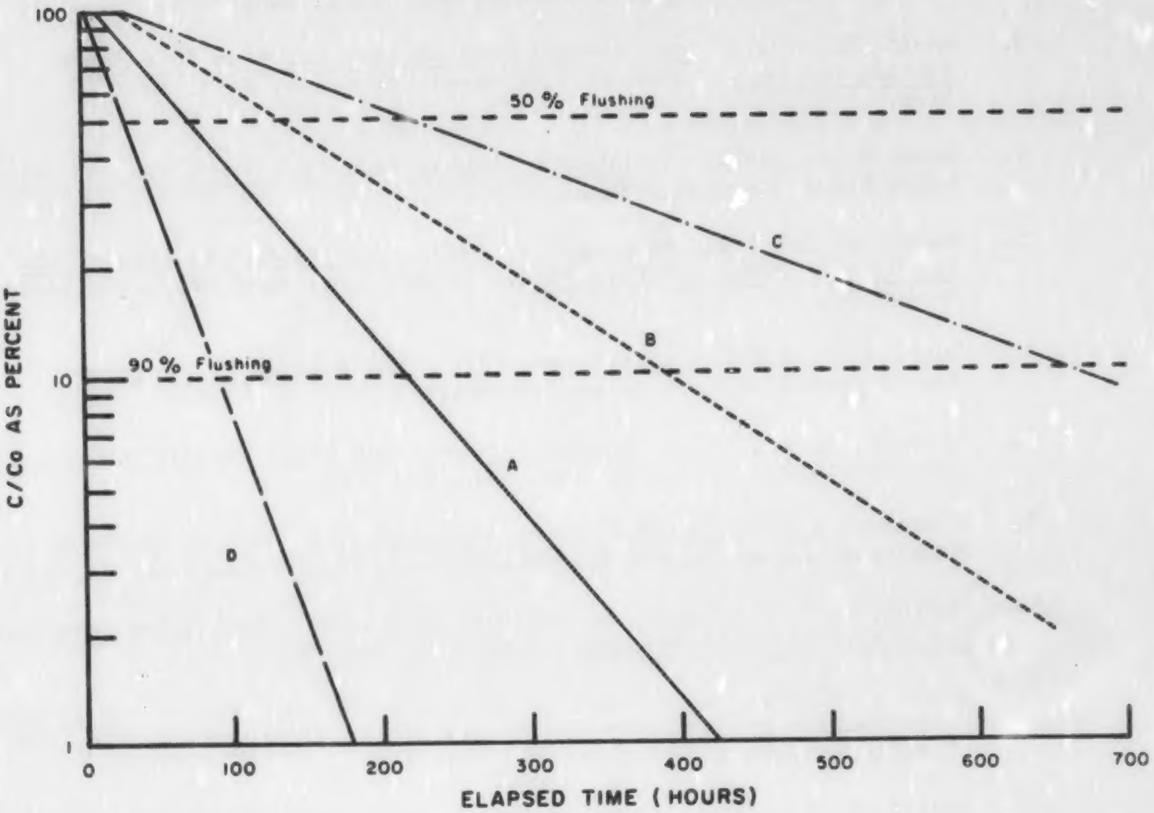


FIGURE III
DISSOLVED OXYGEN SUPPRESSIONS
DUE TO WASTE LOADINGS
CANAL * V BIG PINE KEY, FLORIDA
NOVEMBER, 1973

FIGURE 112
TYPICAL CANAL FLUSHING TIMES
CANAL V
BIG PINE KEY, FLORIDA
NOVEMBER, 1973



KEY

	CASE	LENGTH	DEPTH	WIDTH	
————	A	1,440'	9.6'	40'	(Existing Conditions)
------------	B	2,880'	9.6'	40'	(Length Doubled)
—·—·—	C	1,440'	19.2'	40'	(Depth Doubled)
— — —	D	1,440'	4.8'	40'	(Depth Halved)

REFERENCES

1. Teal, J. M., 1962. Energy Flow in the Salt Marsh Ecosystem of Georgia. Ecology 43 (4):614-624p.

2. Odum, E. P. and A. A. de la Cruz., 1967. Particulate Organic Detritus in a Georgia Salt Marsh - Estuarine Ecosystem in Estuaries, Ed. G. H. Lauff, 383-388. Washington, D. C., AAAS Publ. 83, 757p.

3. Heald, E., 1971. The Production of Organic Detritus in a South Florida Estuary. University of Miami Sea Grant, Tech. Bull. 6, 110p.

4. Odum, W. E., 1971. Pathways of Energy Flow in a South Florida Estuary. Univ. Miami Sea Grant, Tech. Bull. 7, 162 p.

5. Environmental Protection Agency, 1973. Ecosystems Analysis of the Big Cypress Swamp and Estuaries. Surveillance and Analysis Division, Region IV.

6. Lugo, A. E. and S. C. Snedaker, 1974. The Ecology of Mangroves. Annual Review of Ecology and Systematics, Vol. 5, 39-64p.

7. Thomann, R. V., 1972. Systems Analysis and Water Quality Management. Environmental Science Services, ERA, New York.

8. O'Connor, D. J. Stream and Estuarine Analysis. Course Workbook, Manhattan College Summer Institute in Water Pollution Control, New York.

9. Feurstein, D. L., and R. E. Selleck, Aug. 1963. Fluorescent Tracers for Dispersion Measurements. JSED-ASCE, Vol. 89.

10. State of Florida, Department of Pollution Control, 1971. Survey of Water Quality in Waterways and Canals of the Florida Keys. Department of Pollution Control, Tallahassee, Florida.

11. Sawyer, C. N., 1960. Chemistry for Sanitary Engineers. McGraw-Hill, New York.

12. Barth, E. F.; Brenner, R. C. and Lewis, R. F., 1968. Chemical-Biological Control of Nitrogen and Phosphorus in Wastewater Effluent. Jour. WPCF, Vol. 40, 2047p.

13. Chesher, R. H., 1974. Canal Survey Florida Keys. Marine Research Foundation, Inc., Key West, Florida.

14. Mulbarger, M. C., 1971. Nitrification and Dentrification in Activated Sludge Systems. Jour. WPCF, Vol. 43, 2065p.

15. Walker, W. J., Bouma, J., Keeney, D. R. and Olcott, P. G., 1973. Nitrogen Transformations During Subsurface Disposal of Septic Tank Effluent in Sand. II. Ground Water Quality and Environ. Quality, Vol. II, No. 4, 521-525p.

16. Environmental Protection Agency, 1969. Chemistry Laboratory Manual of Bottom Sediments. Great Lakes Region Comm. on Analytical Methods.

17. Environmental Protection Agency, 1973. Sludge and Sediment Analysis. EPA, Region IV, Surveillance and Analysis Division.

18. Russell-Hunter, S. D., 1970. Aquatic Productivity. The McMillan Company, London.

19. Meyer, Charles F., 1973. Polluted Groundwater: Some Causes, Effects, Controls and Monitoring. EPA 600/4-73-001b. U. S. Environmental Protection Agency, Washington, D. C.

20. Barada, William and William M. Partington, 1972. Report of Investigation of the Environmental Effects of Private Waterfront Canals. Environmental Information Center of the Florida Conservation Foundation, Inc., Winter Park, Florida.

21. Smith, Milo and Associates (Tampa, FL), Hale and Kulligren, Inc. (Akron, OH), 1970. Environment and Identity, A Plan Prepared for Monroe County Commission.

22. Anonymous, 1970. Pollution of the Waters of Dade County, Florida. U. S. Department of the Interior, Federal Water Quality Administration, Lower Florida Estuary Study. Fort Lauderdale, Florida.

23. Popkin, F. A. and T. W. Bendixen, 1968. Feasibility of Improved Subsurface Disposal. Jour. San. Eng. Div. ASCE, 94:271p.

24. Anonymous, 1967. Manual of Septic Tank Practice. U. S. Department of Health, Education and Welfare, Public Health Service Publication No. 526, Washington, D. C.

25. Polkowski, L. B. and W. C. Boyle, 1970. Groundwater Quality Adjacent to Septic Tank Soil Absorption System. Report to the Wisconsin Department of Natural Resources.

26. Patterson, J. W., R. A. Minear and T. K. Nedued, 1971. Septic Tanks and the Environment. State of Illinois, Institute for Environmental Quality.

27. Bender, William H., 1971. Soils and Septic Tanks. U. S. Department of Agriculture, Soil Conservation Service. Agriculture Information Bulletin No. 349, Washington, D. C.

28. Kingston, S. P., 1943. Contamination of Water Supplies in Limestone Formation. Jour. AWWA. 35:1450p.

29. Leopold, Luna B., 1968. Hydrology for Urban Land Planning - A Guidebook on the Hydrologic Effects of Urban Land Use. Geological Survey Circular, No. 554. Washington, D. C.

30. Vogt, John E., 1961. Infectious Hepatitis Epidemic at Posen, Mich. Jour. AWWA. 53:1238p.

31. Miller, David W., Frank A. DeLuca and Thomas L. Tessier, 1974. Ground Water Contamination in the Northeast States. U. S. Environmental Protection Agency. Washington, D. C.

32. Maynard, J. W., 1968. Septic Tank Performance Related to Ground Conditions and Population Density. Can. Jour. Pub Health. 60:173p.

33. Hickey, J. L. S. and D. L. Duncan, 1966. Performance of Septic Tanks in Alaska. Jour. WPCF, 38(8):1298p.

34. Craun, G. F., 1973. Microbiology - Waterborne Outbreaks. Jour. WPCF. 45(6):1265p.

35. Leech, R. S., 1951. Septic Tank Sewage Disposal Systems for Farm and Suburban Homes. Indiana State Board of Health, 54:102p.

36. Kiker, J. E., 1968. Fringe Area Sewerage Problems. Jour. San. Eng. Div. ASCE, 84:1714p.

37. Anonymous, 1973. Finger Fill Canal Studies - Punta Gorda and Big Pine Key, Florida. U. S. Environmental Protection Agency, Surveillance and Analysis Division, Athens, GA.

38. Anonymous, 1970. South Carolina Tidelands Report. South Carolina Water Resources Commission, Columbia, SC.

39. Carroll, B. J., 1974. Unpublished data. U. S. Environmental Protection Agency, Athens, Georgia.

40. Anonymous, 1975. Rules and Regulations to Regulate the Installation of Sanitary Water Closets, Septic Tanks, and Disposal Fields. Alabama State Health Department. Montgomery, Alabama.

41. Anonymous, 1969. *Rules and Regulations for Individual Sewage Disposal Systems*. Chapter 270-5-25. Georgia Department of Human Resources. Atlanta, Georgia.

42. Anonymous, 1972. *Rules of State of Florida Department of Pollution Control*. *Standards for Individual Sewage Disposal Facilities*. Chapter 13-17. Tallahassee, Florida.

43. Anonymous, 1969. *Regulation Governing Disposal of Human Excreta and Other Liquid Wastes*. Mississippi State Board of Health, Jackson, Mississippi.

44. Anonymous. *Regulation Number LXXIX for the Treatment and Disposal of Sewage in the Coastal Areas of North Carolina*. Board of Water and Air Resources, Raleigh, North Carolina.

45. Anonymous, 1971. *Rules and Regulations Governing Individual Waste Disposal Systems*. South Carolina State Board of Health, Columbia, South Carolina.

46. Craun, Gunther F. and L. J. McCabe, 1973. *Review of the Causes of Waterborne Disease Outbreaks*. Jour. AWWA. 74p.

47. Eliassen, Rolf and Robert H. Cummings, 1948. *Analysis of Waterborne Outbreaks, 1938 - 45*. Jour. AWWA. 509p.

48. Anaonymous, 1974. *Waterborne Gastrointestinal Illness, Richmond Heights, Florida*. U. S. Public Health Service, National Center for Disease Control. Atlanta, Georgia.

49. Anonymous, 1972. *Typhoid Fever, Washington*. Morbidity and Mortality Weekly Report. Center for Disease Control. 21:290p.

50. Anonymous, 1972. *Center for Disease Control*. Morbidity and Mortality Weekly Report. 198p.

51. Lobel, Hans O., Alan L. Bisno, Martin Goldfield and James E. Prier, 1969. *A Waterborne Epidemic of Gastroenteritis with Secondary Person to Person Spread*. Am. Jour. Epidm. 89(4):384p.

52. Anonymous, 1972. Center for Disease Control. *Hepatitis Surveillance*. 35:8p.

53. Anonymous, 1972. Center for Disease Control. *Hepatitis Surveillance*. 35:10p.

54. Anonymous, 1972. Center for Disease Control. Morbidity and Mortality Weekly Report. 21:439p.

55. Neefe, J. R. and J. Stokes, 1945. An Epidemic of Infectious Hepatitis Apparently Due to a Water Borne Agent. Jour. AMA. 128:1063.

56. Kiker, J. E., 1956. New Developments in Septic Tank Systems. Jour. San. Eng. Div. ASCE. 5:1088p.

57. Clarke, N. A., G. Berg, P. W. Kabler and S. L. Chang, 1964. Human Enteric Viruses in Water: Source, Survival and Removability. Advances in Water Research. Vol. 2:523p.

58. Mechalas, Byron J., K. K. Hekimian, L. A. Schinazi, and R. H. Dudley, 1972. An Investigation into Recreational Water Quality. Water Quality Criteria Data Book, Vol. 4. U. S. Environmental Protection Agency, Washington, DC.

59. Akin, Elmer W., W. H. Benton and W. F. Hill. Enteric Viruses in Ground and Surface Waters: A Review of Their Occurrence and Survival.

60. Gerba, Charles P. and G. E. Schaieberger, 1975. Effects of Particulates on Virus Survival in Seawater. Jour. WPCF. 47(1):93p.

61. Metcalf, T. G. and W. C. Stiles, 1965. The Accumulation of Enteric Viruses by the Oyster, Crassostrea Virginica. Jour. Inf. Dis. 115:68p.

62. Mitchell, J. R., M. W. Presnell, E. W. Akin, J. M. Cummins and O. C. Liv, 1966. Accumulation and Elimination of Polio-Virus by the Eastern Oyster. Am. Jour. Epidemiol. 84:40p.

63. Anonymous, 1965. National Shellfish Sanitation Program Manual of Operations: Part 1, Sanitation of Shellfish Growing Areas. U. S. Department of Health, Education and Welfare. Public Health Service. Washington, DC.

64. Fugate, K. J., D. O. Cliver and T. M. Hatch, 1975. Enteroviruses and Potential Bacterial Indicators in Gulf Coast Oysters. J. Milk Food Tech. Vol. 38(2):100p.

65. Butler, R. G., G. T. Orlob and P. H. McGauhey, 1954. Underground Movement of Bacteria and Chemical Pollutants. Jour. AWWA. 46(2): 97p.

66. Robeck, Gordon G., T. W. Bendixen, W. A. Schwartz and R. L. Woodward, 1963. Factors Influencing the Design and Operation of Soil Systems for Waste Treatment. Jour. WPCF. 36(8):971p.

67. Drewry, William A. and R. Eliassen, 1967. Virus Movement in Groundwater. Jour. WPCF. 40(8),2:R257p.

68. Anonymous, 1957. Underground Waste Disposal and Control - Task Group Report. Jour. AWWA. 1334p.

69. Anonymous, 1954. Final Report on Investigation of Travel of Pollution. Standard Service Agreement No. 12C-13. Sanitary Engineering Research Laboratory, University of California.

70. Mallman, W. L. and W. N. Mack, 1961. Biological Contamination of Groundwater. U. S. Department of Health, Education and Welfare, Public Health Service Technical Report W61-5.

71. Cook, D. G. and R. O. Brinkhurst, 1973. Marine Flora and Fauna of the Northeastern United States. Annelida:Olegochaeta. NOAA Tech. Rept. NMFS CIRC-374. Washington, DC, 25p.

72. Brinkhurst, R. O. and M. L. Simmons, 1968. The Aquatic Olegochaeta of San Francisco Bay System. California Fish and Game. 54:180-194p.

73. Environmental Protection Agency, 1973. Biological Field and Laboratory Methods. National Environmental Research Center, Office of Research and Development, EPA, Cincinnati, Ohio.

74. Humm, H. B., 1973. Benthic Algae of the Eastern Gulf of Mexico. In: A Summary of Knowledge of the Eastern Gulf of Mexico. State University System of Florida, Institute of Oceanography, St. Petersburg, Florida.

75. Humm, H. B., 1973. Seagrasses. In: A Summary of Knowledge of the Eastern Gulf of Mexico. State University of Florida, Institute of Oceanography, St. Petersburg, Florida.

76. Weber, C. I. and B. H. McFarland, 1969. Periphyton Biomass-Chlorophyll Ratio as an Index of Water Quality. Presented at the 17th Annual Meeting of the Midwest Benthological Society, Gilbertsville, Kentucky.

77. Steidinger, Karen A., 1973. Phytoplankton. In: A Summary of Knowledge of the Eastern Gulf of Mexico. State University of Florida, Institute of Oceanography, St. Petersburg, Florida.

78. Langer, J. L., E. E. Pyatt, and R. P. Shubinski, July 1971. Storm Water Management Model, Vols. I-IV, U. S. EPA, Washington, DC, NTIS Nos. PB-203-291, PB-203-292.

79. Metcalf & Eddy, Inc., University of Florida, Water Resources Engineers, Inc. 1971. Storm Water Management Model. Environmental Protection Agency, Water Pollution Control Research Series 11024DOCO 7/71.

80. Feigner, K. D., and H. S. Harris, July 1970. Documentation Report - FWOA Dynamic Estuary Model. USDI, FWQA, Washington, D. C., NTIS No. PB-197-103.

81. Callaway, R. J., K. V. Byram and G. R. Ditsworth, Nov. 1969. Mathematical Model of the Columbia River from the Pacific Ocean to Bonneville Dam. Part I - Theory, Program Notes and Programs. USDI, FWQA, Pacific Northwest Water Laboratory, Corvallis, Oregon, NTIS No. PB-202-422.

82. Callaway, R. J., and K. V. Byram - Mathematical Model of the Columbia River from the Pacific Ocean to Bonneville Dam. Part II - Input - Output and Initial Verification Procedures. U. S. EPA, Pacific Northwest Water Laboratory, Corvallis, Oregon, Dec. 1970, NTIS No. PB-202-423.

83. Clark, L. J., and K. D. Feigner, March 1972. Mathematical Model Studies of Water Quality in the Potomac Estuary. Technical Report 33, Annapolis Field Station, U. S. EPA, Washington, DC.

IX. APPENDICES

Page No.

A. WATER USE CLASSIFICATIONS

1 - Florida 235
2 - North Carolina 239

B. DO, SALINITY AND TEMPERATURE PROFILE DATA 243

1 - November, 1973

  1.1 - Punta Gorda, FL 244
  1.2 - Big Pine Key, FL 253

2 - August - September, 1974

  2.1 - Punta Gorda, FL 263
  2.2 - Big Pine Key, FL 270
  2.3 - Sea-Air Estates, Marathon, FL 279
  2.4 - Atlantic Beach, NC 289
  2.5 - Spooners Creek, NC 300

C. WATER CHEMISTRY DATA

1 - November, 1973

  1.1 - Punta Gorda, FL 308
  1.2 - Big Pine Key, FL 320

2 - August - September, 1974

  2.1 - Punta Gorda, FL 331
  2.2 - Big Pine Key, FL 336
  2.3 - Sea Air Estates, Marathon, FL 342
  2.4 - Panama City, FL 347
  2.5 - Atlantic Beach, NC 358
  2.6 - Spooners Creek, NC 365
  2.7 - Emerald Isles, NC 368

D. SEDIMENT DATA

1 - Distribution of Organic Matter

  1.1 - Punta Gorda, FL 369
  1.2 - Big Pine Key, FL 371
  1.3 - Special Stations, Punta Gorda and Big Pine Key . 373
  1.4 - Sea Air Estates, Marathon, FL 375
  1.5 - Atlantic Beach, NC 376

2 - Particle Size Distribution

  2.1 - Punta Gorda and Big Pine Key, FL 377
  2.2 - Sea Air Estates, Marathon, FL 379
  2.3 - Atlantic Beach, NC 380
3 - Pesticide Detection Limits 381

E. BIOLOGICAL DATA

1 - Macroinvertebrates

  1.1 - Kinds of Benthic Invertebrates, Punta Gorda and Big Pine Key, FL 382
  1.2 - Numbers of Benthic Invertebrates, November 1973, Punta Gorda, FL 385

Page No.

1 - Macroinvertebrates (continued)
  1.3 - Numbers of Benthic Invertebrates, November 1973, Big Pine Key, FL 387
  1.4 - Numbers and Kinds of Benthic Invertebrates, August 1974, Big Pine Key, FL 389
  1.5 - Numbers and Kinds of Benthic Invertebrates, August 1974, Sea Air Estates, Marathon, FL . . . 390
  1.6 - Numbers and Kinds of Benthic Invertebrates September 1974, Atlantic Beach and Spooners Creek, NC 391
2 - Macrophytes
  2.1 - Biomass, November 1973, Big Pine Key, FL 392
  2.2 - Biomass, August 1974, Big Pine Key, FL 413
  2.3 - Associations, November 1973, Big Pine Key, FL . . 417
  2.4 - Associations, August 1974, Big Pine Key, FL . . . 418
3 - Periphyton
  3.1 - Clump Counts, November 1973, Punta Gorda, FL . . 419
  3.2 - Clump Counts, November 1973, Big Pine Key, FL . . 421
  3.3 - Chlorophyll a, November 1973, Punta Gorda, FL . . 422
  3.4 - Organic Matter, November 1973, Punta Gorda, FL. . 423
  3.5 - Autotrophic Index, November 1973, Punta Gorda, FL 424
4 - Phytoplankton
  4.1 - Chlorophyll a, November 1973, Punta Gorda and Big Pine Key, FL 425
  4.2 - Live Counts, November 1973, Punta Gorda and Big Pine Key, FL 426
5 - Light Extinction 427

APPENDIX A-1

Florida Water Use Classifications

Class II waters - shellfish harvesting.

The following criteria are for classification of waters in areas which either actually or protentially have the capability of supporting recreational or commercial shellfish propagation and harvesting. Harvesting may only occur in areas approved by the Division of Health, Florida Department of Health and Rehabilitative Services.

(1) Bacteriological Quality, Coliform Group - areas classified for shellfish harvesting, the median coliform MPN (Most Probable Number) of water cannot exceed seventy (70) per hundred (100) ml., and not more than ten (10) percent of the samples ordinarily exceed an MPN of two hundred and thirty (230) per one hundred (100) ml. in those portions of areas most probably exposed to fecal contamination during most unfavorable hydrographic and pollutional conditions.

(2) Sewage, Industrial Wastes, or Other Wastes - any industrial wastes or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

(3) pH - of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value shall be not less than six (6.0) and upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes, outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(4) Dissolved Oxygen - shall not be artifically depressed below the values of four (4.0) ppm unless background information available to the

regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(5) Toxic Substances - Free from substances attributable to municipal, industrial, agricultural or other discharges in concentrations or combinations which are toxic or harmful to humans, animal or aquatic life.

(6) Odor - threshold odor number not to exceed 24 at 60°C as a daily average.

Class III waters - recreation - propagation and management of fish and wildlife.

The following criteria are for classification of waters to be used for recreational purposes, including such body contact activities as swimming and water skiing; and for the maintenance of a well-balanced fish and wildlife population. All surface waters within and coastal waters contiguous to these basins, including off-shore waters, not otherwise classified shall be classified as Class III; however, waters of the open ocean shall be maintained at a dissolved oxygen of not less than five (5.0) mg/l. Streams specifically listed in Section 17.3.21 by a separate listing designated as "Special Stream Classification" shall similarly be maintained at a minimum dissolved oxygen level of five (5.0) mg/l.

(1) Sewage, industrial wastes, or other wastes - any industrial waste or other wastes shall be effectively treated by the latest modern technological advances as approved by the regulatory agency.

(2) pH - of receiving waters shall not be caused to vary more than one (1.0) unit above or below normal pH of the waters; and lower value

shall be not less than six (6.0), and upper value not more than eight and one-half (8.5). In cases where pH may be, due to natural background or causes outside limits stated above, approval of the regulatory agency shall be secured prior to introducing such material in waters of the state.

(3) Dissolved Oxygen - shall not be artifically depressed below the values of four (4.0) ppm unless background information available to the regulatory agency indicates prior existence under unpolluted conditions of lower values. In such cases, lower limits may be utilized after approval by the regulatory authority.

(4) Bacteriological - coliform group not to exceed 1,000 per 100 ml as a monthly average, (either MPN or MF counts); nor to exceed this number in more than 20% of the samples examined during any month; nor exceed 2,400 per 100 ml (MPN or MF count) on any day. This criteria shall apply only to waters used for body contact activities.

(5) Toxic substances - free from substances attributable to municipal, industrial, agricultural or other discharges in concentrations or combinations which are toxic or harmful to humans, animal or aquatic life.

(6) Deleterious - free from substances attributable to municipal, industrial, agricultural or other discharges producing color, odor or other conditions in such degree as to create a nuisance.

(7) Turbidity - shall not exceed fifty (50) Jackson units as related to standard candle turbidimeter above background.

APPENDIX A-2

RULES, REGULATIONS, CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO THE SURFACE WATERS OF NORTH CAROLINA.

The Declaration of Policy, as set forth in Section 211, Article 21, Chapter 143 of the General Statutes of North Carolina (Chapter 606, Session Laws of 1951) as amended, reads as follows: "It is hereby declared to be the public policy of this State to provide for the conservation of its water and air resources. Furthermore, it is the intent of the General Assembly, within the context of this Article to achieve and to maintain for the citizens of the State a total environment of superior quality. Recognizing that the water and air resources of the State belong to the people, the General Assembly affirms the State's ultimate responsibility for the preservation and development of these resources in the best interest of all its citizens and declares the prudent utilization of these resources to be essential to the general welfare. It is the purpose of this Article to create an agency which shall administer a program of water and air pollution control and water resource management. It is the intent of the General Assembly, through the duties and powers defined herein, to confer such authority upon the Board of Water and Air Resources as shall be necessary to administer a complete program of water and air conservation, pollution abatement and control and to achieve a coordinated effort of pollution abatement and control with other jurisdictions. Standards of water and air purity shall be designed to protect human health, to prevent injury to plant and animal life, to prevent damage to public and private property, to insure the continued enjoyment of the natural attractions of the State, to encourage the expansion of employment opportunities, to provide a permanent foundation for healthy industrial development and to secure for the people of North Carolina, now and in the future, the beneficial use of these great natural resources."

REGULATION NO. XII. - CLASSIFICATIONS FOR TIDAL SALT WATERS AND WATER QUALITY STANDARDS APPLICABLE THERETO. The standards of water quality for each separately identified water to which a classification is assigned shall be those specified for such classification in the following series of Classifications and Water Quality Standards.

1. Class SA Waters:

a. Best Usage of Waters: Shellfishing for market purposes and any other usage requiring waters of lower quality.

b. Conditions Related to Best Usage: Waters will meet the sanitary and bacteriological standards given in the 1965 revision of the "National Shellfish Sanitation Program Manual Of Operations: Part 1, Sanitation of Shellfish Growing Areas", recommended by the Public Health Service and will be considered safe and suitable for shellfish culture.

2. Quality Standards Applicable to Class SA Waters

Items	Specifications
a. Floating solids; settleable	None attributable to sewage, industrial wastes or other wastes.
b. Sewage, industrial wastes, or other wastes.	None which are not effectively treated to the satisfaction of the Board and in accordance with the requirements of the State Board of Health.
c. pH.	Range between 6.8 and 8.5.
d. Dissolved oxygen.	Not less than 5.0 mg/l, except that swamp waters may have a minimum of 4.0 mg/l.
e. Toxic wastes; oils; deleterious substances; colored or other wastes.	Only such amounts, whether alone or in combination with other substances or wastes as will not make the waters unsafe or unsuitable for fish and shellfish or their propagation, impair the palatability of same, or impair the waters for any other best usage established for this class.
f. Organisms of coliform group.	Total coliform group not to exceed a median MPN of 70/100 ml, and not more than 10% of the samples shall exceed an MPN of 230/100 ml for a 5-tube decimal dilution test (or 330/100 ml where a 3-tube decimal dilution is used) in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.
g. Temperature.	Shall not be increased above the natural water temperature by more than 1.5°F. during the months of June, July, and August no more than 4.0%F. during other months and in no case to exceed 90°F., due to the discharge of heated liquids.

3. Class SB Waters

a. Best Usage of Waters: Bathing and any other usage except shellfishing for market purposes.

b. Conditions Related to Best Usage: The waters, under proper sanitary supervision by the controlling health authorities, will meet accepted sanitary standards of water quality for outdoor bathing places and will be considered safe and satisfactory for bathing purposes.

4. Quality Standards Applicable to Class SB Waters

Items	Specifications
a. Floating solids; settleable solids, sludge deposits.	None attributable to sewage, industrial wastes or other wastes.
b. Sewage, industrial wastes, or other wastes.	None which are not effectively treated to the satisfaction of the Board. In determining the degree of treatment required for such waters when discharged into waters to be used for bathing, the Board will take into consideration the quantity and quality of sewage and wastes involved and the proximity of such discharges to the waters in this class.
c. pH.	Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a low of 4.3.
d. Dissolved oxygen.	Not less than 5.0 mg/l, except that swamp waters may have a minimum of 4.0 mg/l.
e. Toxic wastes; oils; deleterious substances; colored or other wastes.	Only such amounts, whether alone or in combination with other substances or wastes as will not make the waters unsafe or unsuitable for bathing, injurious to fish or shellfish, or adversely affect the palatability of same, or impair the waters for any other best usage established for this class.
f. Organisms of coliform group (applicable only during months of May through September. During other months the coliform organism standard for Class "SC" Waters shall apply.)	Fecal coliforms not to exceed a log mean of 200/100 ml (either MPN or MF count) based on at least five consecutive samples examined during any 30-day period and not to exceed 400/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall).

g. Temperature.	Shall not be increased above the natural water temperature by more than 1.5°F. during the months of June, July, and August nor more than 4.0%F. during other months and in no case to exceed 90°F., due to the discharge of heated liquids.

APPENDIX B

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

PARAMETER	DESCRIPTION
00003	SAMPLING STATION LOCATION, VERTICAL (FEET)
00299	OXYGEN, DISSOLVED (ELECTRODE) (MG/L)
00010	TEMPERATURE, WATER (DEGREES CENTIGRADE)
00480	SALINITY - PARTS PER THOUSAND
00003	DEPTH IN FEET

APPENDIX B-1.1

```
         ENVIRONMENTAL PROTECTION AGENCY REGION IV
   SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
        FINGER FILL CANAL STUDY   NOVEMBER 1973
                      PROFILE DATA

STATION - PG-01-D          PUNTA GORDA 50' FRM END CANAL #1
-----------------------------------------------------------------
                       00003       00299       00010       00480
                       DEPTH        DO         WATER      SALINITY
                                   PROHE       TEMP
DATE    TIME            FEET       MG/L        CENT         PPTH

731111 0126               1         5.5        22.9         28.3
731111 0127               2         5.5        23.3         28.4
731111 0128               3         5.5        23.4         28.4
731111 0129               4         5.4        23.4         28.4
731111 0130               5         5.4        23.4         28.4
731111 0131               6         5.4        23.4         28.4
731111 0132               7         5.3        23.4         28.4
731111 0133               8         5.3        23.3         28.4
731111 0134               9         5.1        23.3         28.4
731111 0435               1         5.0        22.6         28.4
731111 0436               2         5.0        22.7         28.3
731111 0437               3         5.0        22.6         28.3
731111 0438               4         5.0        22.6         28.3
731111 0439               5         5.0        22.6         28.2
731111 0440               6         5.0        22.6         28.2
731111 0441               7         4.9        22.5         28.2
731111 0655               1         5.1        20.8         29.2
731111 0656               2         5.1        21.6         28.2
731111 0657               3         5.1        21.6         28.4
731111 0658               4         5.0        21.9         28.4
731111 0659               5         5.0        22.1         28.4
731111 0840               1         5.1        22.0         28.3
731111 0841               2         5.0        22.3         28.3
731111 0842               3         5.0        22.3         28.3
731111 0843               4         5.0        22.3         28.3
731111 1245               1         6.2        22.8         27.3
731111 1246               2         6.2        22.8         27.3
731111 1247               3         6.2        22.8         27.3
731111 1248               4         6.2        22.8         27.3
731111 1249               5         6.2        22.8         27.3
731111 1605               1         6.5        23.0         27.0
731111 1606               2         6.5        23.0         27.0
731111 1607               3         6.5        23.0         27.0
731111 1608               4         6.5        23.0         27.0
731111 1609               5         6.5        23.0         27.0
731111 1610               6         6.6        23.0         27.0
731111 1611               7         6.6        23.0         27.0
731111 1910               1         6.5        22.5         28.2
```

```
         ENVIRONMENTAL PROTECTION AGENCY REGION IV
   SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
        FINGER FILL CANAL STUDY   NOVEMBER 1973
                      PROFILE DATA

STATION - PG-01-D          PUNTA GORDA 50' FRM END CANAL #1
-----------------------------------------------------------------
                       00003       00299       00010       00480
                       DEPTH        DO         WATER      SALINITY
                                   PROBE       TEMP
DATE    TIME            FEET       MG/L        CENT         PPTH

731111 1911               2         6.5        22.5         28.2
731111 1912               3         6.5        22.5         28.2
731111 1913               4         6.5        22.5         28.2
731111 1914               5         6.5        22.5         28.2
731111 1915               6         6.5        22.5         28.2
731111 1916               7         6.4        22.2         28.2
731111 2130               1         6.3        22.0         28.6
731111 2131               2         6.3        22.0         28.6
731111 2132               3         6.3        22.0         28.6
731111 2133               4         6.3        22.0         28.6
731111 2134               5         6.3        22.0         28.6
731111 2135               6         6.3        22.0         28.6
731111 2136               7         6.4        22.0         28.6
731112 0140               1         5.8        21.3         28.5
731112 0141               2         5.8        21.8         28.5
731112 0142               3         5.8        21.6         28.5
731112 0143               4         5.7        21.6         28.5
731112 0144               5         5.7        21.5         28.5
731112 0145               6         5.7        21.5         28.5
731112 0146               7         5.6        21.5         28.4
731112 0420               1         5.5        21.0         28.5
731112 0421               2         5.4        21.3         28.5
731112 0422               3         5.4        21.3         28.5
731112 0423               4         5.4        21.3         28.5
731112 0424               5         5.4        21.3         28.5
731112 0425               6         5.4        21.3         28.5
731112 0740               1         5.2        21.3         28.1
731112 0741               2         5.1        21.3         28.1
731112 0742               3         5.1        21.3         28.1
731112 0743               4         5.1        21.3         28.1
731112 0744               5         5.1        21.3         28.1
731112 1015               1         6.0        21.7         28.2
731112 1016               2         5.9        21.7         28.2
731112 1017               3         5.8        21.6         28.2
731112 1018               4         5.6        21.6         28.2
731112 1019               5         5.6        21.7         28.2

731111
    NUMBER                           74          74           74
    MAXIMUM                         6.6        23.4         29.2
    MINIMUM                         4.9        20.8         27.0
    MEAN                            5.7        22.2         28.2
731112
```

APPENDIX B-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-02-D PUNTA GORDA 1250' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	0145	1	5.7	23.2	28.2
731111	0146	2	5.6	23.3	28.2
731111	0147	3	5.6	23.3	28.2
731111	0148	4	5.5	23.3	28.0
731111	0149	5	5.5	23.3	28.0
731111	0150	6	5.5	23.3	28.1
731111	0151	7	5.4	23.3	28.1
731111	0152	8	5.4	23.3	28.3
731111	0153	9	5.4	23.3	28.3
731111	0445	1	5.2	22.9	28.2
731111	0446	2	5.2	23.1	28.2
731111	0447	3	5.2	23.1	28.2
731111	0448	4	5.2	23.1	28.2
731111	0449	5	5.1	23.1	28.2
731111	0712	1	5.3	22.6	28.2
731111	0713	2	5.3	22.6	28.1
731111	0714	3	5.2	22.5	28.1
731111	0715	4	5.2	22.6	28.1
731111	0716	5	5.2	22.6	28.1
731111	0717	6	5.2	22.6	28.1
731111	0718	7	5.2	22.6	28.1
731111	0719	8	5.2	22.6	28.1
731111	0900	1	5.3	22.2	28.1
731111	0901	2	5.5	22.6	28.1
731111	0902	3	5.2	22.6	28.1
731111	1255	1	6.0	23.0	27.3
731111	1256	2	6.0	23.0	27.3
731111	1257	3	6.0	23.0	27.3
731111	1258	4	6.0	23.0	27.3
731111	1612	1	6.2	23.0	27.0
731111	1613	2	6.2	23.0	27.0
731111	1614	3	6.2	23.0	27.0
731111	1615	4	6.2	23.0	27.0
731111	1616	5	6.2	23.0	27.0
731111	1617	6	6.2	23.0	27.0
731111	1618	7	6.3	23.0	27.0
731111	1925	1	6.0	22.5	28.2
731111	1926	2	6.0	22.5	28.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-02-D PUNTA GORDA 1250' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	1927	3	6.1	22.5	28.2
731111	1928	4	6.1	22.5	28.2
731111	1929	5	6.2	22.5	28.2
731111	1930	6	6.3	22.5	28.2
731111	1931	7	6.3	22.2	28.2
731111	2150	1	5.9	22.1	28.4
731111	2151	2	5.9	22.1	28.4
731111	2152	3	5.9	22.2	28.4
731111	2153	4	5.9	22.4	28.4
731111	2154	5	6.0	22.5	28.4
731111	2155	6	6.0	22.4	28.4
731111	2156	7	6.1	22.3	28.4
731111	2157	8	6.2	22.2	28.4
731112	0200	1	5.8	21.6	27.9
731112	0201	2	5.8	21.6	27.9
731112	0202	3	5.8	21.6	27.9
731112	0203	4	5.8	21.6	28.0
731112	0204	5	5.8	21.5	28.0
731112	0205	6	5.8	21.5	28.0
731112	0206	7	5.7	21.2	28.0
731112	0435	1	5.6	21.3	27.9
731112	0436	2	5.6	21.3	27.9
731112	0437	3	5.5	21.3	27.9
731112	0438	4	5.5	21.3	28.0
731112	0439	5	5.5	21.3	28.0
731112	0440	6	5.5	21.3	28.0
731112	0750	1	5.4	21.2	28.0
731112	0751	2	5.4	21.2	28.0
731112	0752	3	5.3	21.2	28.0
731112	0753	4	5.3	21.2	28.0
731112	1030	1	5.6	21.4	28.0
731112	1031	2	5.6	21.4	27.8
731112	1032	3	5.6	21.4	27.8
731112	1033	4	5.6	21.4	27.8
731112	1034	5	5.6	21.3	27.8
731112	1035	6	5.5	21.3	28.0
731112	1036	7	5.4	21.2	28.0
731111					
NUMBER			75	75	75
MAXIMUM			6.3	23.3	28.4
MINIMUM			5.1	21.2	27.0
MEAN			5.7	22.3	28.0
731112					

APPENDIX B-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-03-D PUNTA GORDA 2500' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	0205	1	5.8	22.4	27.9
731111	0206	2	5.7	22.4	28.1
731111	0207	3	5.5	21.8	28.1
731111	0208	4	5.4	21.8	28.2
731111	0209	5	5.3	21.5	28.2
731111	0210	6	5.2	21.5	28.2
731111	0452	1	5.4	22.3	28.1
731111	0453	2	5.4	22.6	27.8
731111	0454	3	5.4	22.7	27.8
731111	0455	4	5.3	22.7	27.9
731111	0456	5	5.2	22.7	27.9
731111	0720	1	5.3	21.2	28.4
731111	0721	2	5.3	21.0	28.8
731111	0722	3	5.3	20.7	28.8
731111	0723	4	5.2	20.5	29.1
731111	0912	1	5.5	22.1	28.0
731111	0913	2	5.4	22.1	28.0
731111	0914	3	5.4	22.1	28.0
731111	1305	1	5.8	22.8	27.3
731111	1306	2	5.9	22.8	27.3
731111	1307	3	6.0	22.8	27.3
731111	1620	1	7.0	22.0	27.9
731111	1621	2	7.0	22.0	27.9
731111	1622	3	7.0	22.0	27.9
731111	1623	4	7.0	22.0	27.9
731111	1935	1	6.6	21.5	29.0
731111	1936	2	6.7	21.0	29.0
731111	1937	3	6.7	21.0	29.0
731111	1938	4	6.8	21.0	29.0
731111	2200	1	6.2	20.8	29.5
731111	2201	2	6.1	20.6	29.5
731111	2202	3	6.1	20.5	29.5
731111	2203	4	6.2	20.5	29.5
731112	0215	1	6.0	20.7	27.8
731112	0216	2	5.8	20.7	28.0
731112	0217	3	5.8	20.1	28.0
731112	0218	4	5.6	20.1	28.2
731112	0219	5	5.6	19.8	28.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-03-D PUNTA GORDA 2500' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731112	0445	1	5.7	20.5	28.0
731112	0446	2	5.7	20.5	28.0
731112	0447	3	5.7	20.5	28.0
731112	0448	4	5.6	20.5	28.0
731112	0449	5	5.5	20.5	28.0
731112	0755	1	5.5	20.7	27.8
731112	0756	2	5.4	20.7	27.8
731112	0757	3	5.4	20.7	27.8
731112	0758	4	5.4	20.7	27.8
731112	1045	1	5.9	21.5	28.0
731112	1046	2	6.1	21.5	28.0
731112	1047	3	6.1	21.5	28.0
731111					
NUMBER			50	50	50
MAXIMUM			7.0	22.8	29.5
MINIMUM			5.2	19.8	27.3
MEAN			5.8	21.4	28.2
731112					

APPENDIX B-1.1

```
              ENVIRONMENTAL PROTECTION AGENCY REGION IV
          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
              FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - PG-04-D              CHARLOTTE HARBOR BACKGROUND STA.
------------------------------------------------------------------
                       00003       00299       00010       00480
                       DEPTH        DO         WATER     SALINITY
                                   PROBE       TEMP
DATE     TIME          FEET        MG/L        CENT        PPTH

731111 0235              1          5.8        22.5        28.3
731111 0236              2          5.7        22.5        28.3
731111 0237              3          5.7        22.6        28.3
731111 0238              4          5.6        22.6        28.3
731111 0505              1          5.2        20.3        28.2
731111 0506              2          5.2        20.3        28.2
731111 0507              3          5.1        20.5        28.2
731111 0728              1          4.8        21.5        27.1
731111 0729              2          4.8        21.5        27.0
731111 0730              3          4.8        21.5        27.0
731111 0930              1          5.5        21.1        26.5
731111 0931              2          5.5        21.1        26.5
731111 1325              1          7.3        22.0        27.8
731111 1326              2          7.4        22.0        27.8
731111 1327              3          7.5        22.0        27.8
731111 1625              1          6.6        21.1        28.2
731111 1626              2          6.6        21.1        28.2
731111 1627              3          6.6        21.1        28.2
731111 1628              4          6.6        21.1        28.2
731111 1950              1          6.8        21.1        28.9
731111 1951              2          6.8        21.1        28.9
731111 1952              3          6.9        21.1        28.9
731111 1953              4          6.8        21.1        28.9
731111 2210              1          6.6        21.1        29.1
731111 2211              2          6.6        21.1        29.1
731111 2212              3          6.6        21.1        29.1
731111 2213              4          6.6        21.1        29.1
731112 0235              1          6.9        20.8        28.2
731112 0236              2          6.9        20.8        28.2
731112 0237              3          6.9        20.8        28.2
731112 0238              4          6.9        20.8        28.2
731112 0452              1          5.2        19.8        28.2
731112 0453              2          5.2        20.0        28.2
731112 0454              3          5.2        20.0        28.2
731112 0455              4          5.2        20.0        28.2
731112 0456              5          5.2        20.0        28.2
731112 0800              1          5.3        19.7        27.7
731112 0801              2          5.2        19.7        27.7
731112 0802              3          5.2        19.7        27.7
731112 0803              4          5.1        19.7        27.7
731112 1100              1          5.8        20.9        26.6
731112 1101              2          5.7        20.9        26.6
731112 1102              3          5.6        20.9        26.6

731111
    NUMBER                           43          43          43
    MAXIMUM                         7.5        22.6        29.1
    MINIMUM                         4.8        19.7        26.5
    MEAN                            6.0        21.0        28.0
731112
```

APPENDIX B-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-05-D PUNTA GORDA 50' FRM END CANAL #2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	0300	1	3.9	22.6	28.3
731111	0301	2	3.9	23.3	28.2
731111	0302	3	3.9	23.3	28.2
731111	0303	4	3.8	23.3	28.2
731111	0304	5	3.8	23.6	28.2
731111	0305	6	3.7	23.6	28.2
731111	0528	1	3.8	23.0	28.2
731111	0529	2	3.8	23.0	28.2
731111	0530	3	3.8	23.0	28.2
731111	0531	4	3.7	23.0	28.4
731111	0750	1	3.8	22.4	28.0
731111	0751	2	3.8	22.4	28.0
731111	0752	3	3.7	22.6	28.0
731111	1005	1	4.4	22.7	27.9
731111	1006	2	4.4	22.7	28.0
731111	1400	1	5.4	23.6	26.9
731111	1401	2	5.4	23.6	26.9
731111	1402	3	5.4	23.5	26.9
731111	1650	1	5.4	23.5	27.4
731111	1651	2	5.4	23.5	27.4
731111	1652	3	5.4	23.5	27.4
731111	1653	4	5.4	23.5	27.4
731111	2020	1	5.2	23.0	28.0
731111	2021	2	5.2	23.0	28.0
731111	2022	3	5.2	22.9	28.0
731111	2023	4	5.2	22.8	28.0
731111	2230	1	5.0	22.2	28.3
731111	2231	2	5.0	22.2	28.3
731111	2232	3	5.2	22.2	28.3
731111	2233	4	5.2	22.2	28.3
731112	0310	1	4.6	21.5	27.8
731112	0311	2	4.5	21.9	27.8
731112	0312	3	4.5	21.9	27.8
731112	0313	4	4.5	21.9	27.8
731112	0314	5	4.5	21.9	27.8
731112	0510	1	4.2	21.6	27.8
731112	0511	2	4.2	21.6	27.8
731112	0512	3	4.2	21.6	27.8

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-05-D PUNTA GORDA 50' FRM END CANAL #2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731112	0513	4	4.2	21.6	27.8
731112	0815	1	4.5	20.8	27.9
731112	0816	2	4.4	21.3	27.7
731112	0817	3	4.4	21.3	27.7
731112	1140	1	5.4	22.3	27.6
731112	1141	2	5.3	22.3	27.6
731112	1142	3	5.3	22.3	27.6
731111					
NUMBER			45	45	45
MAXIMUM			5.4	23.6	28.4
MINIMUM			3.7	20.8	26.9
MEAN			4.6	22.6	27.9
731112					

APPENDIX B-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-06-D PUNTA GORDA 1000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	0315	1	5.3	23.2	28.2
731111	0316	2	5.3	23.2	27.9
731111	0317	3	5.3	23.3	27.9
731111	0318	4	5.3	23.3	27.8
731111	0319	5	5.3	23.2	27.8
731111	0320	6	5.2	23.2	28.0
731111	0321	7	5.2	23.1	28.0
731111	0542	1	5.2	22.8	28.2
731111	0543	2	5.2	23.0	28.0
731111	0544	3	5.1	23.2	28.0
731111	0545	4	5.1	23.2	28.0
731111	0546	5	5.1	23.2	28.0
731111	0547	6	5.0	23.2	28.0
731111	0755	1	5.0	22.6	27.9
731111	0756	2	5.0	22.6	28.0
731111	0757	3	5.0	22.6	28.0
731111	0758	4	5.0	22.6	28.0
731111	0759	5	5.0	22.6	28.0
731111	0800	6	5.0	22.6	28.0
731111	1020	1	5.5	22.8	27.9
731111	1021	2	5.4	22.8	27.9
731111	1022	3	5.4	22.8	27.9
731111	1023	4	5.3	22.8	27.9
731111	1024	5	5.3	22.8	27.9
731111	1410	1	6.0	23.9	26.8
731111	1411	2	6.0	23.8	26.8
731111	1412	3	5.9	23.6	26.9
731111	1413	4	5.9	23.6	26.9
731111	1414	5	5.9	23.5	26.9
731111	1655	1	6.4	23.5	27.5
731111	1656	2	6.4	23.5	27.5
731111	1657	3	6.5	23.5	27.5
731111	1658	4	6.5	23.5	27.5
731111	1659	5	6.5	23.5	27.5
731111	1700	6	6.5	23.5	27.5
731111	2035	1	6.0	22.5	28.0
731111	2036	2	6.2	23.0	28.0
731111	2037	3	6.3	23.1	28.0

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-06-D PUNTA GORDA 1000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	2038	4	6.3	23.1	28.0
731111	2039	5	6.1	23.0	28.0
731111	2040	6	5.9	22.8	28.0
731111	2240	1	5.8	22.5	28.2
731111	2241	2	5.8	22.5	28.2
731111	2242	3	5.8	22.5	28.2
731111	2243	4	5.8	22.5	28.2
731111	2244	5	5.8	22.5	28.2
731111	2245	6	5.8	22.5	28.2
731112	0325	1	5.3	21.7	27.7
731112	0326	2	5.3	22.1	27.7
731112	0327	3	5.3	22.1	27.7
731112	0328	4	5.5	21.9	27.7
731112	0329	5	5.6	21.0	28.4
731112	0330	6	5.6	21.0	28.4
731112	0515	1	5.4	21.3	27.8
731112	0516	2	5.2	21.3	27.8
731112	0517	3	5.2	21.3	27.8
731112	0518	4	5.2	21.3	27.8
731112	0519	5	5.3	21.3	27.8
731112	0520	6	5.3	21.3	27.8
731112	0825	1	5.2	20.8	27.6
731112	0826	2	5.2	20.8	27.6
731112	0827	3	5.2	21.0	27.6
731112	0828	4	5.2	21.0	27.6
731112	0829	5	5.2	21.0	27.6
731112	0830	6	5.1	21.0	27.6
731112	1153	1	5.6	22.2	27.5
731112	1154	2	5.6	22.2	27.5
731112	1155	3	5.5	21.8	27.5
731112	1156	4	5.5	21.8	27.6
731112	1157	5	5.3	21.8	27.6
731111					
NUMBER			70	70	70
MAXIMUM			6.5	23.9	28.4
MINIMUM			5.0	20.8	26.8
MEAN			5.5	22.5	27.8
731112					

APPENDIX B-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-07-D PUNTA GORDA 2000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731111	0335	1	5.3	21.5	27.5
731111	0336	2	5.2	22.2	27.2
731111	0337	3	5.1	22.4	27.2
731111	0338	4	5.1	22.4	27.2
731111	0339	5	5.1	22.0	27.2
731111	0340	6	5.1	22.0	27.2
731111	0550	1	5.0	22.2	27.2
731111	0551	2	5.0	22.2	27.2
731111	0552	3	5.0	22.3	27.2
731111	0553	4	4.9	22.3	27.2
731111	0554	5	4.9	22.3	27.2
731111	0802	1	5.0	22.0	27.3
731111	0803	2	4.9	22.0	27.3
731111	0804	3	4.9	22.2	27.3
731111	1030	1	5.6	22.6	27.4
731111	1031	2	5.6	22.6	27.4
731111	1032	3	5.6	22.6	27.4
731111	1425	1	5.7	23.8	26.9
731111	1426	2	5.7	23.8	26.9
731111	1427	3	5.7	23.8	26.9
731111	1705	1	6.2	22.8	28.1
731111	1706	2	6.5	22.2	28.1
731111	1707	3	6.8	22.2	28.1
731111	1708	4	6.8	22.2	28.1
731111	2045	1	6.2	21.8	28.7
731111	2046	2	6.2	21.8	28.7
731111	2047	3	6.1	21.6	29.1
731111	2048	4	6.1	21.5	29.1
731111	2250	1	6.1	21.0	29.2
731111	2251	2	6.1	21.0	29.2
731111	2252	3	6.1	21.0	29.2
731111	2253	4	6.1	21.0	29.2
731112	0343	1	5.8	20.9	27.6
731112	0344	2	5.7	20.9	27.6
731112	0345	3	5.6	20.7	27.6
731112	0346	4	5.6	20.5	28.0
731112	0347	5	5.6	20.5	28.0
731112	0525	1	5.4	20.8	27.8

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - PG-07-D PUNTA GORDA 2000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731112	0526	2	5.5	20.8	27.8
731112	0527	3	5.5	21.0	27.8
731112	0528	4	5.4	21.0	27.8
731112	0529	5	5.4	21.0	27.8
731112	0835	1	5.2	20.8	27.6
731112	0836	2	5.2	20.8	27.6
731112	0837	3	5.2	20.8	27.6
731112	0838	4	5.2	20.8	27.6
731112	1205	1	5.8	22.2	27.5
731112	1206	2	5.8	22.2	27.5
731112	1207	3	5.7	22.2	27.5
731111					
NUMBER			49	49	49
MAXIMUM			6.8	23.8	29.2
MINIMUM			4.9	20.5	26.9
MEAN			5.6	21.8	27.8
731112					

APPENDIX B-1.1

```
           ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - PG-A-D           PUNTA GORDA SPECIAL STATION
------------------------------------------------------------
                    00003      00299      00010       00480
                    DEPTH        DO       WATER     SALINITY
                               PROBE       TEMP
DATE    TIME         FEET       MG/L       CENT        PPTH

731111 2320            1         6.0       21.9        28.4
731111 2321            2         6.0       22.0        28.3
731111 2322            3         5.9       22.1        28.2

731111
    NUMBER                         3          3           3
    MAXIMUM                      6.0       22.1        28.4
    MINIMUM                      5.9       21.9        28.2
    MEAN                         6.0       22.0        28.3
731111
```

```
           ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - PG-B-D           PUNTA GORDA SPECIAL STATION
------------------------------------------------------------
                    00003      00299      00010       00480
                    DEPTH        DO       WATER     SALINITY
                               PROBE       TEMP
DATE    TIME         FEET       MG/L       CENT        PPTH

731111 2345            1         6.3       21.5        28.8
731111 2346            2         6.3       21.5        28.8
731111 2347            3         6.3       21.5        28.8
731111 2348            4         6.5       21.0        28.8

731111
    NUMBER                         4          4           4
    MAXIMUM                      6.5       21.5        28.8
    MINIMUM                      6.3       21.0        28.8
    MEAN                         6.3       21.4        28.8
731111
```

```
           ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - PG-C-D           PUNTA GORDA SPECIAL STATION
------------------------------------------------------------
                    00003      00299      00010       00480
                    DEPTH        DO       WATER     SALINITY
                               PROBE       TEMP
DATE    TIME         FEET       MG/L       CENT        PPTH

731112 0540            1         5.6       21.0        26.4
731112 0541            2         5.6       21.0        26.4
731112 0542            3         5.6       21.0        26.4
731112 0543            4         5.6       21.0        26.4
731112 0544            5         5.5       21.0        26.4

731112
    NUMBER                         5          5           5
    MAXIMUM                      5.6       21.0        26.4
    MINIMUM                      5.5       21.0        26.4
    MEAN                         5.6       21.0        26.4
731112
```

```
           ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - PG-D-D           PUNTA GORDA SPECIAL STATION
------------------------------------------------------------
                    00003      00299      00010       00480
                    DEPTH        DO       WATER     SALINITY
                               PROBE       TEMP
DATE    TIME         FEET       MG/L       CENT        PPTH

731111 1730            1         5.8       25.5        27.5
731111 1731            2         5.8       25.5        27.5
731111 1732            3         5.7       25.5        27.5
731111 1733            4         5.6       25.3        27.5
731111 1734            5         5.4       23.2        27.5
731111 1735            6         4.4       23.2        27.5
731111 1736            7         3.9       23.2        27.5
731111 1737            8         3.9       23.2        27.5
731111 1738            9         3.7       23.0        27.6

731111
    NUMBER                         9          9           9
    MAXIMUM                      5.8       25.5        27.6
    MINIMUM                      3.7       23.0        27.5
    MEAN                         4.9       24.2        27.5
731111
```

APPENDIX B-1.1

```
          ENVIRONMENTAL PROTECTION AGENCY REGION IV
      SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                        PROFILE DATA

STATION - PG-E-D              PUNTA GORDA SPECIAL STATION
------------------------------------------------------------
                  00003       00299       00010       00480
                  DEPTH        DO         WATER     SALINITY
                             PROBE        TEMP
DATE   TIME        FEET       MG/L        CENT        PPTH

731111 1800          1         4.9        23.8        27.4
731111 1801          2         4.9        23.8        27.4
731111 1802          3         4.8        23.7        27.4
731111 1803          4         4.9        23.7        27.4
731111 1804          5         4.9        23.6        27.4
731111 1805          6         5.0        23.5        27.4
731111 1806          7         5.0        23.5        27.4
731111 1807          8         4.4        23.5        27.4

731111
    NUMBER                       8           8           8
    MAXIMUM                    5.0        23.8        27.4
    MINIMUM                    4.4        23.5        27.4
    MEAN                       4.8        23.6        27.4
731111
```

APPENDIX B-1.2

```
          ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                        PROFILE DATA

STATION - BPK-08-D          BIG PINE KEY 50' FM END CANAL #3
------------------------------------------------------------
                     00003       00299      00010      00480
                     DEPTH        DO        WATER     SALINITY
                                PROBE       TEMP
DATE    TIME          FEET       MG/L       CENT        PPTH

731117 1200            1          6.1       24.2        37.4
731117 1201            2          6.1       24.1        37.4
731117 1202            3          6.1       24.1        37.4
731117 1203            4          6.1       24.0        37.4
731117 1204            5          6.0       24.0        37.4
731117 1205            6          6.0       24.0        37.4
731117 1206            7          6.0       24.0        37.4
731117 1207            8          6.0       24.0        37.4
731117 1208            9          6.1       24.0        37.4
731117 1455            1          6.1       24.2        37.4
731117 1456            2          6.1       24.2        37.4
731117 1457            3          6.0       24.1        37.4
731117 1458            4          5.8       24.1        37.4
731117 1459            5          5.7       24.1        37.4
731117 1500            6          5.7       24.1        37.4
731117 1501            7          5.7       24.1        37.4
731117 1502            8          5.6       24.1        37.4
731117 1503            9          5.6       24.1        37.4
731117 1810            1          6.1       24.0        37.5
731117 1811            2          6.0       24.0        37.5
731117 1812            3          6.0       24.0        37.5
731117 1813            4          6.0       24.0        37.5
731117 1814            5          5.9       24.0        37.5
731117 1815            6          5.9       24.0        37.5
731117 1816            7          6.0       24.0        37.5
731117 1817            8          6.0       24.0        37.5
731117 1818            9          5.9       24.0        37.5
731117 2055            1          5.9       24.0        37.6
731117 2056            2          5.9       24.0        37.6
731117 2057            3          6.0       24.0        37.6
731117 2058            4          6.0       24.0        37.6
731117 2059            5          6.0       24.0        37.6
731117 2100            6          6.0       24.0        37.6
731117 2101            7          6.0       24.0        37.6
731117 2102            8          6.0       24.0        37.6
731117 2103            9          6.0       24.0        37.6
731118 0015            1          5.8       24.0        38.2
731118 0016            2          5.8       24.0        38.2
```

```
          ENVIRONMENTAL PROTECTION AGENCY REGION IV
     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY   NOVEMBER 1973
                        PROFILE DATA

STATION - BPK-08-D          BIG PINE KEY 50' FM END CANAL #3
------------------------------------------------------------
                     00003       00299      00010      00480
                     DEPTH        DO        WATER     SALINITY
                                PROBE       TEMP
DATE    TIME          FEET       MG/L       CENT        PPTH

731118 0017            3          5.8       23.9        38.2
731118 0018            4          5.8       23.9        38.2
731118 0019            5          5.8       23.9        38.2
731118 0020            6          5.8       23.9        38.2
731118 0021            7          5.8       24.0        38.2
731118 0022            8          5.8       24.0        38.2
731118 0023            9          5.8       24.0        38.2
731118 0350            1          5.7       24.1        38.1
731118 0351            2          5.7       24.1        38.2
731118 0352            3          5.7       24.1        38.2
731118 0353            4          5.6       24.1        38.2
731118 0354            5          5.7       24.1        38.2
731118 0355            6          5.7       24.1        38.2
731118 0356            7          5.8       24.1        38.2
731118 0357            8          5.7       24.1        38.2
731118 0358            9          5.7       24.1        38.2
731118 0630            1          5.4       23.9        38.1
731118 0631            2          5.4       23.9        38.1
731118 0632            3          5.4       23.9        38.1
731118 0633            4          5.4       23.9        38.1
731118 0634            5          5.4       24.0        38.2
731118 0635            6          5.4       24.0        38.2
731118 0636            7          5.3       24.0        38.2
731118 0637            8          5.3       24.0        38.2
731118 0638            9          5.3       24.0        38.2
731118 0639           10          5.3       24.0        38.2
731118 1010            1          5.4       24.2        38.3
731118 1011            2          5.4       24.2        38.3
731118 1012            3          5.5       24.2        38.3
731118 1013            4          5.4       24.2        38.3
731118 1014            5          5.4       24.2        38.3
731118 1015            6          5.3       24.2        38.3
731118 1016            7          5.4       24.2        38.3
731118 1017            8          5.5       24.2        38.3
731118 1215            1          5.8       24.7        38.2
731118 1216            2          5.7       24.7        38.3
731118 1217            3          5.7       24.5        38.3
731118 1218            4          5.7       24.5        38.3
731118 1219            5          6.2       24.5        38.3
731118 1220            6          6.2       24.5        38.3
731118 1221            7          6.2       24.5        38.3
731118 1222            8          6.2       24.5        38.4
731118 1223            9          6.2       24.5        38.4

731117
     NUMBER                        81         81          81
     MAXIMUM                      6.2       24.7        38.4
     MINIMUM                      5.3       23.9        37.4
     MEAN                         5.8       24.1        37.9
731118
```

APPENDIX B-1.2

```
              ENVIRONMENTAL PROTECTION AGENCY REGION IV
          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
               FINGER FILL CANAL STUDY   NOVEMBER 1973
                            PROFILE DATA

STATION - BPK-09-D          BIG PINE KEY 780' FM END CANAL#3
--------------------------------------------------------------
                      00003      00299      00010      00480
                      DEPTH       DO        WATER     SALINITY
                                 PROBE      TEMP
DATE    TIME          FEET       MG/L       CENT        PPTH

731117 1220             1         5.9       24.2        37.4
731117 1221             2         5.9       24.1        37.4
731117 1222             3         5.8       24.1        37.4
731117 1223             4         5.7       24.0        37.4
731117 1224             5         5.7       24.0        37.4
731117 1225             6         5.7       24.0        37.4
731117 1226             7         5.5       24.0        37.4
731117 1227             8         5.3       24.0        37.4
731117 1505             1         5.6       24.3        37.4
731117 1506             2         5.5       24.3        37.4
731117 1507             3         5.5       24.2        37.4
731117 1508             4         5.5       24.2        37.4
731117 1509             5         5.5       24.1        37.4
731117 1510             6         5.4       24.0        37.4
731117 1511             7         5.4       24.0        37.4
731117 1512             8         5.4       24.0        37.4
731117 1513             9         5.4       24.0        37.4
731117 1830             1         5.9       24.0        37.5
731117 1831             2         5.9       24.0        37.5
731117 1832             3         6.0       24.0        37.5
731117 1833             4         5.9       24.0        37.5
731117 1834             5         5.9       24.0        37.5
731117 1835             6         6.0       24.0        37.5
731117 1836             7         6.0       24.0        37.5
731117 1837             8         6.0       24.0        37.5
731117 1838             9         6.0       24.0        37.5
731117 2105             1         6.2       24.0        37.6
731117 2106             2         6.2       24.0        37.6
731117 2107             3         6.2       24.0        37.6
731117 2108             4         6.2       24.0        37.6
731117 2109             5         6.1       24.0        37.6
731117 2110             6         6.1       24.0        37.6
731117 2111             7         6.1       24.0        37.6
731117 2112             8         6.1       24.0        37.6
731117 2113             9         6.1       24.0        37.6
731118 0030             1         5.9       24.0        38.2
731118 0031             2         5.9       24.0        38.2
731118 0032             3         5.9       24.0        38.2
```

```
              ENVIRONMENTAL PROTECTION AGENCY REGION IV
          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
               FINGER FILL CANAL STUDY   NOVEMBER 1973
                            PROFILE DATA

STATION - BPK-09-D          BIG PINE KEY 780' FM END CANAL#3
--------------------------------------------------------------
                      00003      00299      00010      00480
                      DEPTH       DO        WATER     SALINITY
                                 PROBE      TEMP
DATE    TIME          FEET       MG/L       CENT        PPTH

731118 0033             4         5.9       24.0        38.2
731118 0034             5         5.9       24.0        38.2
731118 0035             6         5.9       24.0        38.2
731118 0036             7         5.9       24.0        38.2
731118 0037             8         5.9       24.0        38.2
731118 0038             9         5.9       24.0        38.2
731118 0400             1         5.7       24.1        38.2
731118 0401             2         5.7       24.1        38.2
731118 0402             3         5.7       24.1        38.2
731118 0403             4         5.7       24.1        38.2
731118 0404             5         5.7       24.1        38.2
731118 0405             6         5.7       24.1        38.2
731118 0406             7         5.8       24.1        38.2
731118 0407             8         5.8       24.1        38.2
731118 0408             9         5.8       24.1        38.2
731118 0615             1         5.6       23.9        38.2
731118 0616             2         5.6       23.9        38.2
731118 0617             3         5.6       23.9        38.2
731118 0618             4         5.6       23.9        38.2
731118 0619             5         5.5       23.9        38.2
731118 0620             6         5.6       23.9        38.2
731118 0621             7         5.6       23.9        38.2
731118 0622             8         5.6       23.9        38.2
731118 0623             9         5.5       23.9        38.2
731118 0624            10         5.5       23.9        38.2
731118 1000             1         5.5       24.6        38.2
731118 1001             2         5.5       24.4        38.2
731118 1002             3         5.4       24.4        38.2
731118 1003             4         5.4       24.4        38.2
731118 1004             5         5.4       24.4        38.2
731118 1005             6         5.4       24.4        38.2
731118 1006             7         5.5       24.4        38.2
731118 1007             8         5.5       24.4        38.2
731118 1008             9         5.5       24.4        38.2
731118 1205             1         6.0       24.6        38.4
731118 1206             2         5.9       24.7        38.4
731118 1207             3         6.2       24.7        38.4
731118 1208             4         6.3       24.7        38.4
731118 1209             5         6.3       24.5        38.5
731118 1210             6         6.3       24.5        38.5
731118 1211             7         6.1       24.4        38.5
731118 1212             8         6.1       24.4        38.5
731118 1213             9         6.1       24.4        38.5

 731117
     NUMBER                       81         81          81
     MAXIMUM                     6.3       24.7        38.5
     MINIMUM                     5.3       23.9        37.4
     MEAN                        5.8       24.1        37.9
 731118
```

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-10-D BIG PINE KEY 1560' FM END CANL#3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1240	1	6.2	24.3	37.4
731117	1241	2	6.1	24.2	37.4
731117	1242	3	6.0	24.1	37.4
731117	1243	4	6.0	24.1	37.4
731117	1244	5	5.9	24.1	37.4
731117	1245	6	6.0	24.0	37.4
731117	1246	7	6.1	24.0	37.4
731117	1247	8	6.0	24.0	37.4
731117	1248	9	6.0	24.0	37.4
731117	1514	1	6.1	24.3	37.4
731117	1515	2	6.2	24.3	37.4
731117	1516	3	6.3	24.3	37.4
731117	1517	4	6.3	24.3	37.4
731117	1518	5	6.4	24.3	37.4
731117	1519	6	6.4	24.3	37.4
731117	1520	7	6.5	24.3	37.4
731117	1521	8	6.8	24.2	37.4
731117	1522	9	6.9	24.1	37.4
731117	1900	1	6.8	24.0	37.5
731117	1901	2	6.7	24.0	37.5
731117	1902	3	6.6	24.0	37.5
731117	1903	4	6.6	24.0	37.5
731117	1904	5	6.5	24.0	37.5
731117	1905	6	6.5	24.0	37.5
731117	1906	7	6.6	24.0	37.5
731117	1907	8	6.6	24.0	37.5
731117	1908	9	6.6	24.0	37.5
731117	2114	1	6.7	24.0	37.6
731117	2115	2	6.7	24.0	37.6
731117	2116	3	6.7	24.0	37.6
731117	2117	4	6.7	24.0	37.6
731117	2118	5	6.7	24.0	37.6
731117	2119	6	6.7	24.0	37.6
731117	2120	7	6.8	24.0	37.6
731117	2121	8	6.9	24.0	37.6
731117	2122	9	6.9	24.0	37.6
731118	0045	1	6.4	24.0	38.2
731118	0046	2	6.2	24.0	38.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-10-D BIG PINE KEY 1560' FM END CANL#3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731118	0047	3	6.3	24.0	38.2
731118	0048	4	6.3	24.0	38.2
731118	0049	5	6.3	24.0	38.2
731118	0050	6	6.3	24.0	38.2
731118	0051	7	6.3	24.0	38.2
731118	0052	8	6.3	24.0	38.2
731118	0053	9	6.2	24.0	38.2
731118	0410	1	6.2	24.1	38.4
731118	0411	2	6.2	24.1	38.4
731118	0412	3	6.2	24.1	38.4
731118	0413	4	6.2	24.1	38.4
731118	0414	5	6.2	24.1	38.4
731118	0415	6	6.1	24.1	38.4
731118	0416	7	6.1	24.1	38.4
731118	0417	8	6.1	24.1	38.4
731118	0418	9	6.0	24.1	38.4
731118	0419	10	5.9	24.1	38.4
731118	0600	1	5.9	24.0	38.2
731118	0601	2	5.9	24.0	38.2
731118	0602	3	5.9	24.0	38.2
731118	0603	4	5.9	24.0	38.2
731118	0604	5	5.8	24.0	38.2
731118	0605	6	5.9	24.0	38.2
731118	0606	7	5.9	24.0	38.2
731118	0607	8	5.9	24.0	38.2
731118	0608	9	5.9	24.0	38.2
731118	0609	10	5.8	24.0	38.2
731118	0945	1	5.6	24.9	38.0
731118	0946	2	5.7	24.9	38.0
731118	0947	3	5.6	24.7	38.0
731118	0948	4	5.6	24.7	38.0
731118	0949	5	5.6	24.7	38.0
731118	0950	6	5.5	24.7	38.0
731118	0951	7	5.3	24.4	38.0
731118	0952	8	5.0	24.4	38.0
731118	0953	9	5.0	24.4	38.4
731118	0954	10	5.0	24.4	38.4
731118	1150	1	5.9	24.8	38.2
731118	1151	2	5.8	24.8	38.2

APPENDIX B-1.2

```
             ENVIRONMENTAL PROTECTION AGENCY REGION IV
       SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
             FINGER FILL CANAL STUDY   NOVEMBER 1973
                          PROFILE DATA

STATION - BPK-10-D          BIG PINE KEY 1560' FM END CANL#3
----------------------------------------------------------------
                     00003      00299       00010      00480
                     DEPTH        DO        WATER     SALINITY
                               PROBE        TEMP
DATE   TIME           FEET     MG/L         CENT        PPTH

731118 1152             3        5.8        24.8        38.4
731118 1153             4        5.8        24.6        38.4
731118 1154             5        5.8        24.6        38.4
731118 1155             6        5.8        24.6        38.4
731118 1156             7        5.8        24.5        38.4
731118 1157             8        6.0        24.5        38.4
731118 1158             9        6.1        24.5        38.4

731117
    NUMBER                        84          84          84
    MAXIMUM                      6.9        24.9        38.4
    MINIMUM                      5.0        24.0        37.4
    MEAN                         6.1        24.2        37.9
731118
```

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-11-D BOGIE CHANNEL BACKGROUND STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1300	1	7.1	24.2	37.4
731117	1301	2	7.1	24.2	37.4
731117	1302	3	7.1	24.2	37.4
731117	1523	1	7.9	24.6	37.3
731117	1524	2	7.9	24.6	37.3
731117	1525	3	8.0	24.6	37.3
731117	1920	1	6.9	24.0	37.5
731117	1921	2	6.9	24.0	37.5
731117	1922	3	6.9	24.0	37.5
731117	2123	1	6.6	24.0	37.2
731117	2124	2	6.6	24.0	37.2
731117	2125	3	6.6	24.0	37.2
731118	0100	1	5.9	23.8	38.2
731118	0101	2	5.8	23.8	38.2
731118	0102	3	5.8	23.8	38.2
731118	0420	1	6.2	23.8	38.4
731118	0421	2	6.1	23.8	38.4
731118	0422	3	6.1	23.8	38.4
731118	0423	4	6.1	23.8	38.4
731118	0650	1	4.5	23.9	38.5
731118	0651	2	4.4	23.9	38.5
731118	0652	3	4.2	23.9	38.5
731118	1020	1	6.3	24.3	38.3
731118	1021	2	6.4	24.3	38.3
731118	1022	3	6.4	24.3	38.3
731118	1230	1	7.6	25.0	37.8
731118	1231	2	7.6	25.0	37.8
731118	1232	3	7.6	25.0	37.8
731117					
NUMBER			28	28	28
MAXIMUM			8.0	25.0	38.5
MINIMUM			4.2	23.8	37.2
MEAN			6.5	24.2	37.9
731118					

APPENDIX B-1.2

```
        ENVIRONMENTAL PROTECTION AGENCY REGION IV
    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
       FINGER FILL CANAL STUDY   NOVEMBER 1973
                      PROFILE DATA

STATION - BPK-12-D          BIG PINE KEY 50' FM END CANAL #4
-------------------------------------------------------------
                      00003      00299      00010      00480
                      DEPTH        DO       WATER    SALINITY
                                 PROBE      TEMP
DATE    TIME          FEET       MG/L       CENT       PPTH

731117 1335             1         5.2       24.8       37.2
731117 1336             2         5.2       24.8       37.2
731117 1337             3         5.2       24.8       37.2
731117 1338             4         5.1       24.8       37.2
731117 1339             5         5.1       24.7       37.2
731117 1340             6         5.1       24.6       37.2
731117 1341             7         5.0       24.6       37.2
731117 1342             8         4.8       24.5       37.2
731117 1343             9         4.7       24.5       37.2
731117 1530             1         5.1       24.8       37.1
731117 1531             2         5.2       24.8       37.1
731117 1532             3         5.4       24.8       37.1
731117 1533             4         5.1       24.8       37.1
731117 1534             5         5.1       24.8       37.1
731117 1535             6         5.1       24.8       37.1
731117 1536             7         5.0       24.8       37.1
731117 1537             8         4.9       24.8       37.1
731117 1935             1         5.6       24.2       37.2
731117 1936             2         5.4       24.2       37.2
731117 1937             3         5.3       24.3       37.2
731117 1938             4         5.3       24.4       37.2
731117 1939             5         5.3       24.5       37.2
731117 1940             6         5.3       24.5       37.2
731117 1941             7         5.2       24.5       37.2
731117 1942             8         5.2       24.5       37.2
731117 2135             1         5.3       24.2       37.0
731117 2136             2         5.3       24.2       37.0
731117 2137             3         5.3       24.3       37.0
731117 2138             4         5.3       24.3       37.0
731117 2139             5         5.3       24.3       37.0
731117 2140             6         5.3       24.5       37.0
731117 2141             7         5.3       24.5       37.0
731117 2142             8         5.3       24.5       37.0
731118 0110             1         5.2       24.0       38.2
731118 0111             2         5.3       24.2       38.2
731118 0112             3         5.2       24.4       38.2
731118 0113             4         5.1       24.5       38.2
731118 0114             5         5.0       24.5       38.2
```

```
        ENVIRONMENTAL PROTECTION AGENCY REGION IV
    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
       FINGER FILL CANAL STUDY   NOVEMBER 1973
                      PROFILE DATA

STATION - BPK-12-D          BIG PINE KEY 50' FM END CANAL #4
-------------------------------------------------------------
                      00003      00299      00010      00480
                      DEPTH        DO       WATER    SALINITY
                                 PROBE      TEMP
DATE    TIME          FEET       MG/L       CENT       PPTH

731118 0115             6         5.0       24.5       38.2
731118 0116             7         5.0       24.5       38.2
731118 0117             8         5.0       24.5       37.9
731118 0435             1         3.9       24.2       38.2
731118 0436             2         4.0       24.2       38.2
731118 0437             3         4.1       24.2       38.2
731118 0438             4         4.1       24.2       38.2
731118 0439             5         4.1       24.2       38.2
731118 0440             6         4.1       24.2       38.2
731118 0441             7         4.0       24.2       38.2
731118 0442             8         4.0       24.2       38.2
731118 0720             1         4.4       24.2       38.2
731118 0721             2         4.4       24.2       38.2
731118 0722             3         4.4       24.2       38.2
731118 0723             4         4.4       24.2       38.2
731118 0724             5         4.4       24.2       38.2
731118 0725             6         4.2       24.2       38.2
731118 0726             7         4.1       24.2       38.2
731118 0727             8         4.1       24.2       38.2
731118 0728             9         4.1       24.2       38.2
731118 1040             1         4.5       25.0       38.0
731118 1041             2         4.5       25.0       38.0
731118 1042             3         4.5       25.0       38.0
731118 1043             4         4.5       25.0       38.0
731118 1044             5         4.5       25.0       38.0
731118 1045             6         4.4       25.0       38.0
731118 1046             7         4.4       25.0       38.0
731118 1047             8         4.4       25.0       38.0
731118 1300             1         5.0       25.3       38.1
731118 1301             2         5.0       25.3       38.1
731118 1302             3         4.9       25.2       38.1
731118 1303             4         4.9       25.2       38.1
731118 1304             5         4.9       25.2       38.1
731118 1305             6         4.9       25.2       38.1
731118 1306             7         4.8       25.2       38.1
731118 1307             8         4.8       25.2       38.1
731118 1308             9         4.8       25.2       38.1

731117
    NUMBER                       75          75         75
    MAXIMUM                     5.6        25.3       38.2
    MINIMUM                     3.9        24.0       37.0
    MEAN                        4.8        24.6       37.7
731118
```

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-13-D BIG PINE KEY 360' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1350	1	5.4	24.8	37.2
731117	1351	2	5.4	24.8	37.2
731117	1352	3	5.4	24.7	37.2
731117	1353	4	5.5	24.7	37.2
731117	1354	5	5.5	24.7	37.2
731117	1355	6	5.5	24.6	37.2
731117	1356	7	5.4	24.6	37.2
731117	1540	1	5.9	24.8	37.1
731117	1541	2	5.8	24.8	37.1
731117	1542	3	5.8	24.8	37.1
731117	1543	4	5.7	24.8	37.1
731117	1544	5	5.7	24.8	37.1
731117	1545	6	5.7	24.8	37.1
731117	1546	7	5.7	24.8	37.1
731117	1950	1	5.6	24.1	37.2
731117	1951	2	5.6	24.2	37.2
731117	1952	3	5.6	24.3	37.2
731117	1953	4		24.3	
731117	1954	5	5.5	24.3	37.2
731117	1955	6	5.1	24.4	37.2
731117	1956	7	4.9	24.5	37.2
731117	2143	1	5.5	24.3	37.0
731117	2144	2	5.5	24.3	37.0
731117	2145	3	5.5	24.3	37.0
731117	2146	4	5.5	24.3	37.0
731117	2147	5	5.3	24.3	37.0
731117	2148	6	5.1	24.3	37.0
731117	2149	7	5.1	24.3	37.0
731118	0118	1	5.4	24.1	37.9
731118	0119	2	5.4	24.1	37.9
731118	0120	3	5.3	24.1	37.9
731118	0121	4	5.0	24.2	37.9
731118	0122	5	4.5	24.4	37.9
731118	0123	6	4.4	24.4	37.9
731118	0124	7	4.2	24.4	35.8
731118	0445	1	4.3	24.3	38.1
731118	0446	2	4.3	24.3	38.1
731118	0447	3	4.3	24.3	38.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-13-D BIG PINE KEY 360' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731118	0448	4	4.3	24.3	38.1
731118	0449	5	4.3	24.3	38.1
731118	0450	6	4.1	24.3	38.1
731118	0451	7	3.9	24.3	38.1
731118	0452	8	3.8	24.3	38.1
731118	0730	1	4.6	24.2	38.2
731118	0731	2	4.6	24.2	38.2
731118	0732	3	4.6	24.2	38.2
731118	0733	4	4.6	24.2	38.2
731118	0734	5	4.5	24.2	38.2
731118	0735	6	4.0	24.2	38.2
731118	0736	7	4.0	24.2	38.2
731118	1050	1	4.6	24.9	38.0
731118	1051	2	4.6	24.9	38.0
731118	1052	3	4.7	24.9	38.0
731118	1053	4	4.5	24.9	38.0
731118	1054	5	4.6	24.9	38.0
731118	1055	6	4.7	24.9	38.0
731118	1056	7	4.6	24.9	38.0
731118	1315	1	5.4	25.4	38.2
731118	1316	2	5.4	25.4	38.2
731118	1317	3	5.4	25.4	38.2
731118	1318	4	5.4	25.2	38.2
731118	1319	5	5.4	25.2	38.2
731118	1320	6	5.3	25.2	38.2
731117					
NUMBER			62	63	62
MAXIMUM			5.9	25.4	38.2
MINIMUM			3.8	24.1	35.8
MEAN			5.0	24.5	37.6
731118					

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-14-D BIG PINE KEY 725' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1405	1	5.3	24.6	37.2
731117	1406	2	5.2	24.6	37.2
731117	1407	3	5.2	24.5	37.2
731117	1408	4	5.1	24.5	37.2
731117	1409	5	5.1	24.4	37.2
731117	1410	6	5.1	24.4	37.2
731117	1411	7	4.7	24.3	37.2
731117	1551	2	5.7	24.5	37.1
731117	1552	3	5.7	24.5	37.1
731117	1553	4	5.3	24.5	37.1
731117	1554	5	5.3	24.5	37.1
731117	1555	6	5.3	24.5	37.1
731117	1556	7	5.3	24.3	37.2
731117	2005	1	5.5	24.2	37.1
731117	2006	2	5.4	24.2	37.1
731117	2007	3	5.4	24.2	37.1
731117	2008	4	5.4	24.2	37.1
731117	2009	5	5.4	24.2	37.1
731117	2010	6	5.3	24.2	37.1
731117	2011	7	5.2	24.2	37.1
731117	2150	1	5.5	24.1	37.0
731117	2151	2	5.5	24.1	37.0
731117	2152	3	5.5	24.1	37.0
731117	2153	4	5.5	24.1	37.0
731117	2154	5	5.5	24.1	37.0
731117	2155	6	5.5	24.1	37.0
731117	2156	7	5.3	24.1	37.0
731118	0130	1	5.4	24.1	38.2
731118	0131	2	5.3	24.1	38.2
731118	0132	3	5.3	24.1	38.2
731118	0133	4	5.2	24.1	38.2
731118	0134	5	5.2	24.1	38.2
731118	0135	6	4.9	24.1	38.2
731118	0136	7	4.6	24.1	37.3
731118	0455	1	4.4	24.4	38.1
731118	0456	2	4.4	24.4	38.1
731118	0457	3	4.4	24.4	38.1
731118	0458	4	4.4	24.4	38.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-14-D BIG PINE KEY 725' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO. PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731118	0459	5	4.4	24.4	38.1
731118	0500	6	4.3	24.4	38.1
731118	0501	7	4.3	24.4	38.1
731118	0745	1	4.7	24.4	38.3
731118	0746	2	4.7	24.4	38.3
731118	0747	3	4.6	24.4	38.3
731118	0748	4	4.6	24.4	38.3
731118	0749	5	4.4	24.4	38.3
731118	0750	6	4.3	24.4	38.3
731118	0751	7	4.0	24.4	38.3
731118	1100	1	4.6	24.9	38.1
731118	1101	2	4.5	24.9	38.1
731118	1102	3	4.5	24.9	38.1
731118	1103	4	4.5	24.9	38.1
731118	1104	5	4.4	24.9	38.1
731118	1105	6	4.4	24.9	38.1
731118	1106	7	4.4	24.9	38.1
731118	1330	1	5.2	25.3	38.3
731118	1331	2	5.2	25.3	38.4
731118	1332	3	5.2	25.3	38.4
731118	1333	4	5.2	25.3	38.4
731118	1334	5	5.1	25.3	38.4
731118	1335	6	4.8	25.3	38.4
731118	1550	1	5.7	24.5	37.1
731117					
NUMBER			62	62	62
MAXIMUM			5.7	25.3	38.4
MINIMUM			4.0	24.1	37.0
MEAN			5.0	24.5	37.7
731118					

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-F-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1715	1	5.2	24.6	37.1
731117	1716	2	5.1	24.6	37.1
731117	1717	3	5.1	24.6	37.1
731117	1718	4	5.1	24.6	37.1
731117	1719	5	5.1	24.6	37.1
731117	1720	6	5.0	24.6	37.1
731117	1721	7	5.0	24.6	37.1
731117	1722	8	5.0	24.5	37.1
731117	2157	1	5.1	24.1	37.0
731117	2158	2	5.1	24.1	37.0
731117	2159	3	4.9	24.1	37.0
731117	2200	4	5.0	24.1	37.0
731117	2201	5	5.0	24.1	37.0
731117	2202	6	5.0	24.1	37.0
731117	2203	7	4.7	24.4	37.0
731117	2204	8	4.2	24.4	37.0
731118	0505	1	3.5	24.4	38.2
731118	0506	2	3.5	24.4	38.2
731118	0507	3	3.5	24.4	38.2
731118	0508	4	3.5	24.4	38.2
731118	0509	5	3.5	24.4	38.2
731118	0510	6	3.4	24.4	38.2
731118	0511	7	3.4	24.4	38.2
731118	0512	8	3.4	24.4	38.2
731118	0805	1	3.6	24.4	38.1
731118	0806	2	3.7	24.4	38.1
731118	0807	3	3.7	24.3	38.1
731118	0808	4	3.6	24.3	38.1
731118	0809	5	3.6	24.3	38.1
731118	0810	6	3.6	24.3	38.1
731118	0811	7	3.6	24.3	38.1
731118	0812	8	3.6	24.3	38.1
731118	1025	1	4.2	24.7	38.0
731118	1026	2	4.1	24.7	38.0
731118	1027	3	4.1	24.7	38.0
731118	1028	4	4.1	24.7	38.0
731118	1029	5	4.1	24.7	38.0
731118	1030	6	4.0	24.7	38.0

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-F-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731118	1031	7	4.0	24.7	38.0
731118	1032	8	4.0	24.7	38.0
731118	1250	1	4.9	25.4	37.5
731118	1251	2	4.9	25.4	37.5
731118	1252	3	4.8	25.3	37.5
731118	1253	4	4.8	25.3	37.5
731118	1254	5	4.8	25.3	37.5
731118	1255	6	4.7	25.3	37.5
731118	1256	7	4.7	25.3	37.5
731118	1257	8	4.6	25.3	37.5
731117					
NUMBER			48	48	48
MAXIMUM			5.2	25.4	38.2
MINIMUM			3.4	24.1	37.0
MEAN			4.3	24.6	37.6
731118					

APPENDIX B-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-G-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731117	1610	1	0.5	24.4	37.2
731117	1611	2	0.9	24.4	37.2
731117	1612	3	1.0	24.3	37.2
731117	1613	4	1.9	24.2	37.2
731117	1614	5	3.1	24.2	37.2
731117	1615	6	2.9	24.2	37.2
731117	1616	7	2.5	24.2	37.2
731117	1617	8	2.5	24.2	37.2
731117	1618	9	2.3	24.1	37.2
731117	1619	10	1.1	24.1	37.2
731117	2330	1	1.4	24.1	37.0
731117	2331	2	2.3	24.1	37.0
731117	2332	3	2.7	24.1	37.0
731117	2333	4	2.9	24.1	37.0
731117	2334	5	3.4	24.1	37.0
731117	2335	6	3.9	24.1	37.0
731117	2336	7	4.5	24.1	37.0
731117	2337	8	4.3	24.1	37.0
731117	2338	9	3.3	24.1	37.0
731117	2339	10	0.6	24.0	37.0
731118	0515	1	0.8	24.2	38.0
731118	0516	2	2.0	24.2	38.0
731118	0517	3	2.9	24.2	38.0
731118	0518	4	2.8	24.2	38.0
731118	0519	5	3.2	24.2	38.0
731118	0520	6	3.1	24.2	38.0
731118	0521	7	2.7	24.2	38.0
731118	0522	8	2.5	24.2	38.0
731118	0523	9	2.6	24.2	38.0
731118	0524	10	2.6	24.2	38.0
731118	0820	1	0.7	24.2	38.1
731118	0821	2	0.7	24.2	38.1
731118	0822	3	2.6	24.2	38.1
731118	0823	4	2.6	24.2	38.1
731118	0824	5	3.0	24.2	38.1
731118	0825	6	3.0	24.2	38.1
731118	0826	7	2.6	24.2	38.1
731118	0827	8	2.7	24.2	38.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
PROFILE DATA

STATION - BPK-G-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
731118	0828	9	2.9	24.2	38.1
731118	0829	10	2.4	24.2	38.1
731118	1110	1	0.4	24.6	37.8
731118	1111	2	0.5	24.6	37.8
731118	1112	3	0.4	24.3	37.8
731118	1113	4	0.5	24.3	37.8
731118	1114	5	0.6	24.3	37.8
731118	1115	6	1.3	24.3	37.8
731118	1116	7	1.9	24.3	37.8
731118	1117	8	2.6	24.3	38.1
731118	1118	9	2.6	24.3	38.1
731118	1400	1	2.0	25.6	37.7
731118	1401	2	2.8	25.6	37.7
731118	1402	3	3.4	25.6	37.7
731118	1403	4	3.6	25.3	38.0
731118	1404	5	3.2	25.3	38.0
731118	1405	6	2.9	25.3	38.0
731118	1406	7	2.6	25.3	38.0
731118	1407	8	1.7	25.1	38.2
731118	1408	9	0.9	25.1	38.2
731117					
NUMBER			58	58	58
MAXIMUM			4.5	25.6	38.2
MINIMUM			0.4	24.0	37.0
MEAN			2.2	24.4	37.7
731118					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-01-D PUNTA GORDA 50' FRM END CANAL #1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740814	1250	1	5.9	32.2	6.9
740814	1251	2	3.6	30.8	8.8
740814	1252	3	3.0	30.1	9.2
740814	1253	4	2.4	30.0	9.6
740814	1254	5	1.9	30.2	10.2
740814	1255	6	0.5	30.2	12.2
740814	1256	7	0.0	29.8	14.6
740814	1257	8	0.0	29.3	20.8
740814	1258	9	0.0	28.6	29.8
740814	1610	1	8.7	34.1	7.1
740814	1611	2	7.6	32.9	7.8
740814	1612	3	2.4	30.5	10.8
740814	1613	4	1.6	30.3	11.6
740814	1614	5	0.3	30.3	12.2
740814	1615	6	0.0	30.1	14.5
740814	1616	7	0.0	29.1	26.5
740814	1940	1	7.8	31.1	7.3
740814	1941	2	7.6	31.5	7.3
740814	1942	3	3.6	31.7	9.3
740814	1943	4	1.5	31.3	11.1
740814	1944	5	0.0	30.6	14.6
740814	1945	6	0.0	30.1	22.0
740814	1946	7	0.0	29.3	30.1
740814	2305	1	6.5	30.4	8.3
740814	2306	2	6.7	31.2	8.5
740814	2307	3	6.4	31.6	9.0
740814	2308	4	5.6	31.7	9.5
740814	2309	5	0.7	30.5	13.7
740814	2310	6	0.0	29.9	16.4
740814	2311	7	0.0	29.9	28.4
740815	0300	1	4.6	30.8	8.2
740815	0301	2	6.0	31.2	9.0
740815	0302	3	5.9	31.1	10.0
740815	0303	4	4.9	30.9	10.6
740815	0304	5	3.0	30.4	13.7
740815	0305	6	0.2	29.7	18.1
740815	0306	7	0.0	28.9	29.0
740815	0540	1	4.9	31.9	8.1
740815	0541	2	4.6	31.9	8.4
740815	0542	3	4.4	32.0	8.7
740815	0543	4	4.1	31.6	10.8
740815	0544	5	1.8	31.0	13.6
740815	0545	6	0.0	30.5	19.0
740815	0546	7	0.0	30.1	27.6
740815	0815	1	4.9	31.4	6.6
740815	0816	2	4.8	31.6	6.9
740815	0817	3	4.3	31.7	7.7

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-01-D PUNTA GORDA 50' FRM END CANAL #1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740815	0818	4	3.8	31.7	8.2
740815	0819	5	2.3	31.2	10.3
740815	0820	6	0.0	30.4	14.9
740815	0821	7	0.0	29.8	26.6
740815	1115	1	6.8	31.5	6.3
740815	1116	2	5.6	31.5	7.2
740815	1117	3	4.8	31.6	8.6
740815	1118	4	3.3	31.5	10.0
740815	1119	5	2.0	31.4	10.6
740815	1120	6	1.1	31.2	11.5
740815	1121	7	0.8	30.7	15.0
740815	1122	8	0.0	29.5	29.2
740815	1330	1	5.8	32.7	4.6
740815	1331	2	4.3	31.4	5.8
740815	1332	3	3.7	30.8	5.8
740815	1333	4	3.2	30.5	6.0
740815	1334	5	3.2	30.6	6.2
740815	1335	6	2.2	30.5	6.7
740815	1336	7	1.0	30.7	7.4
740815	1337	8	0.4	30.0	12.1
740815	1338	9	0.3	29.3	[illegible]
740814					
NUMBER			68	68	68
MAXIMUM			8.7	34.1	30.1
MINIMUM			0.0	28.6	4.6
MEAN			2.9	30.8	12.6
740815					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-02-D PUNTA GORDA 1250' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740814	1320	1	5.3	32.1	7.9
740814	1321	2	4.4	30.5	8.3
740814	1322	3	2.5	29.6	9.2
740814	1323	4	2.1	29.8	10.6
740814	1324	5	3.0	29.8	11.2
740814	1325	6	1.8	30.0	12.2
740814	1326	7	0.0	29.8	14.4
740814	1327	8	0.0	29.0	25.5
740814	1328	9	0.0	28.3	30.4
740814	1329	10	0.0	27.8	31.5
740814	1625	1	7.1	32.5	7.8
740814	1626	2	6.1	31.9	8.2
740814	1627	3	3.4	30.8	9.9
740814	1628	4	3.3	30.2	11.2
740814	1629	5	2.5	30.3	12.4
740814	1630	6	0.1	30.0	14.1
740814	1631	7	0.0	29.1	24.8
740814	1632	8	0.0	28.2	30.5
740814	1633	9	0.0	28.0	31.3
740814	1950	1	6.7	31.3	7.9
740814	1951	2	6.3	31.3	7.8
740814	1952	3	5.6	31.5	9.0
740814	1953	4	2.2	30.5	11.0
740814	1954	5	0.0	30.3	12.8
740814	1955	6	0.0	29.5	23.4
740814	1956	7	0.0	28.9	29.8
740814	1957	8	0.0	28.2	31.2
740814	2315	1	4.3	30.1	4.3
740814	2316	2	6.2	31.0	7.4
740814	2317	3	5.9	31.3	9.1
740814	2318	4	3.2	31.0	11.3
740814	2319	5	1.6	30.4	13.0
740814	2320	6	0.0	29.8	18.0
740814	2321	7	0.0	28.9	29.2
740814	2322	8	0.0	28.5	32.3
740815	0310	1	5.9	31.1	8.2
740815	0311	2	6.1	31.2	8.9
740815	0312	3	5.2	30.5	9.2
740815	0313	4	4.3	31.2	12.5
740815	0314	5	3.2	30.6	15.6
740815	0315	6	0.5	30.1	18.7
740815	0550	1	5.3	31.4	7.7
740815	0551	2	5.0	31.4	9.2
740815	0552	3	4.7	31.4	9.8
740815	0553	4	4.8	31.5	10.5
740815	0554	5	0.5	30.8	15.2
740815	0825	1	4.6	30.9	5.8

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-02-D PUNTA GORDA 1250' FM END CANAL#1

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740815	0826	2	4.5	30.9	5.8
740815	0827	3	4.0	31.1	6.5
740815	0828	4	3.8	31.4	8.1
740815	0829	5	3.2	31.1	11.0
740815	0830	6	0.7	30.4	15.1
740815	1130	1	5.3	31.5	6.9
740815	1131	2	4.8	31.5	8.4
740815	1132	3	4.0	31.4	8.8
740815	1133	4	3.5	30.8	8.8
740815	1134	5	3.1	31.0	10.6
740815	1135	6	1.9	30.9	12.0
740815	1136	7	0.1	30.3	18.6
740815	1350	1	6.7	31.8	3.8
740815	1351	2	5.4	31.1	4.3
740815	1352	3	3.7	30.7	4.8
740815	1353	4	4.4	30.3	5.3
740815	1354	5	3.8	30.3	5.8
740815	1355	6	3.1	30.1	6.5
740815	1356	7	0.3	30.3	7.3
740815	1357	8	0.2	29.8	7.9
740815	1358	9	0.2	29.3	22.1
740815	1359	10	0.1	28.2	26.7
740814					
NUMBER			69	69	69
MAXIMUM			7.1	32.5	32.3
MINIMUM			0.0	27.8	3.8
MEAN			2.9	30.4	13.3
740815					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-03-D PUNTA GORDA 2500' FM END CANAL#1

		00003	00299	00010	00480
		DEPTH	DO	WATER	SALINITY
			PROBE	TEMP	
DATE	TIME	FEET	MG/L	CENT	PPTH
740814	1345	1	4.5	31.0	8.4
740814	1346	2	2.9	29.9	9.3
740814	1347	3	4.0	30.2	10.3
740814	1348	4	4.2	30.5	10.8
740814	1349	5	4.3	30.6	11.6
740814	1350	6	3.8	30.6	12.3
740814	1351	7	0.2	30.1	30.1
740814	1641	2	4.4	30.8	9.0
740814	1645	1	4.4	31.0	8.5
740814	1647	3	3.6	30.5	9.1
740814	1648	4	3.4	30.2	10.4
740814	1649	5	3.6	30.3	12.2
740814	2000	1	4.7	30.6	4.0
740814	2001	2	5.1	31.1	8.1
740814	2002	3	3.7	31.1	9.2
740814	2003	4	1.8	30.3	12.1
740814	2330	1	3.4	30.2	4.1
740814	2331	2	4.8	30.2	6.3
740814	2332	3	5.2	31.0	9.1
740814	2333	4	3.2	30.8	11.6
740814	2334	5	0.5	30.3	14.0
740815	0330	1	4.5	30.7	13.1
740815	0331	2	4.8	31.0	13.3
740815	0332	3	5.6	31.1	13.0
740815	0333	4	5.6	31.1	12.8
740815	0334	5	5.6	31.1	12.6
740815	0600	1	4.8	31.3	7.9
740815	0601	2	4.6	31.3	8.3
740815	0602	3	4.4	31.2	8.6
740815	0603	4	4.3	31.3	9.5
740815	0830	1	3.3	30.0	4.5
740815	0831	2	3.6	30.1	7.3
740815	0832	3	3.8	30.2	8.7
740815	0833	4	3.0	30.2	10.7
740815	0834	5	2.0	30.3	11.4
740815	1140	1	4.3	31.1	7.8
740815	1141	2	4.0	30.9	8.5
740815	1142	3	3.8	30.9	9.6
740815	1143	4	4.1	30.9	9.9
740815	1144	5	4.2	30.9	10.2
740815	1410	1	5.5	31.8	4.2
740815	1411	2	4.3	31.1	6.2
740815	1412	3	7.0	31.3	7.7
740815	1413	4	7.6	31.6	8.3
740815	1414	5	7.6	31.6	8.6
740815	1415	6	7.6	31.5	8.7
740815	1416	7	2.9	30.9	10.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-03-D PUNTA GORDA 2500' FM END CANAL#1

		00003	00299	00010	00480
		DEPTH	DO	WATER	SALINITY
			PROBE	TEMP	
DATE	TIME	FEET	MG/L	CENT	PPTH
740815	1642	1	6.6	31.9	0.5
740815	1643	2	4.2	30.3	2.1
740815	1644	3	3.5	30.1	1.2
740815	1645	4	3.0	30.1	2.4
740815	1646	5	2.8	30.3	3.0
740815	1647	6	2.4	30.2	3.4
740815	1648	7	1.5	30.1	4.4
740815	1649	8	0.5	29.9	6.1
740814					
NUMBER			55	55	55
MAXIMUM			7.6	31.9	30.1
MINIMUM			0.2	29.9	0.5
MEAN			4.1	30.7	8.8
740815					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-04-D CHARLOTTE HARBOR BACKGROUND STA.

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740814	1405	1	12.3	34.3	10.2
740814	1406	2	10.6	33.7	10.7
740814	1407	3	10.5	33.3	10.8
740814	1408	4	7.0	31.7	14.0
740814	1409	5	5.9	31.9	14.5
740814	1700	1	5.1	31.9	8.1
740814	1701	2	5.1	31.9	8.1
740814	1702	3	5.1	31.8	8.3
740814	1703	4	4.9	31.7	10.2
740814	2015	1	4.3	30.6	4.0
740814	2016	2	4.4	30.3	4.2
740814	2017	3	4.6	30.3	4.9
740814	2345	1	9.1	31.0	11.7
740814	2346	2	9.1	31.1	11.6
740814	2347	3	9.0	31.1	11.5
740814	2348	4	8.8	31.2	11.5
740815	0340	1	7.5	31.8	14.7
740815	0341	2	5.6	31.6	15.8
740815	0342	3	5.6	31.6	16.0
740815	0343	4	5.4	31.7	17.0
740815	0610	1	3.6	30.5	10.1
740815	0611	2	3.5	31.5	14.3
740815	0612	3	3.0	31.7	15.5
740815	0613	4	4.6	31.6	15.3
740815	0614	5	3.7	31.7	16.1
740815	0845	1	5.3	30.4	8.9
740815	0846	2	5.2	30.4	10.3
740815	0847	3	4.9	30.8	11.4
740815	0848	4	4.2	31.2	11.8
740815	0849	5	4.0	31.4	13.1
740815	1150	1	8.8	30.9	11.5
740815	1151	2	6.5	31.3	14.4
740815	1152	3	2.2	31.3	15.3
740815	1153	4	0.2	31.3	15.4
740815	1154	5	0.1	31.4	15.5
740815	1155	6	0.0	31.4	15.5
740815	1420	1	10.3	32.6	9.1
740815	1421	2	10.9	32.4	9.1
740815	1422	3	9.8	32.3	9.2
740815	1423	4	8.3	32.3	9.3
740815	1424	5	3.2	31.4	10.5
740814					
NUMBER			41	41	41
MAXIMUM			12.3	34.3	17.0
MINIMUM			0.0	30.3	4.0
MEAN			5.9	31.6	11.7
740815					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-05-D PUNTA GORDA 50' FRM END CANAL #2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	·00480 SALINITY PPTH
740814	1430	1	3.1	30.3	4.1
740814	1431	2	2.4	30.3	6.2
740814	1432	3	2.2	30.0	6.7
740814	1433	4	1.8	30.0	7.4
740814	1434	5	2.3	30.2	8.0
740814	1435	6	1.2	29.4	12.4
740814	1436	7	0.0	28.8	30.2
740814	1730	1	5.2	32.8	3.5
740814	1731	2	5.1	32.7	3.4
740814	1732	3	2.9	31.2	5.1
740814	1733	4	2.1	30.2	6.8
740814	1734	5	0.5	30.2	8.5
740814	1735	6	0.0	28.8	30.3
740814	2030	1	5.5	31.2	3.1
740814	2031	2	5.1	31.2	3.2
740814	2032	3	2.5	31.1	5.0
740814	2033	4	1.7	29.9	7.6
740814	2034	5	0.8	28.9	28.7
740814	2035	6	0.0	28.8	30.3
740815	0015	1	4.2	30.2	4.6
740815	0016	2	3.8	30.8	5.2
740815	0017	3	3.2	30.5	6.0
740815	0018	4	2.6	30.6	6.6
740815	0019	5	0.6	30.0	8.6
740815	0020	6	0.0	29.0	30.0
740815	0400	1	4.0	30.5	6.7
740815	0401	2	3.9	30.7	6.7
740815	0402	3	3.4	31.0	6.8
740815	0403	4	3.5	31.0	7.7
740815	0404	5	2.2	30.1	22.4
740815	0405	6	0.0	29.5	32.4
740815	0635	1	3.8	30.4	3.6
740815	0636	2	3.7	30.6	3.6
740815	0637	3	3.6	31.0	3.9
740815	0638	4	3.3	30.7	7.4
740815	0639	5	0.6	29.8	28.3
740815	0640	6	0.0	29.3	30.0
740815	0900	1	3.6	30.2	3.1
740815	0901	2	3.5	30.2	3.1
740815	0902	3	3.4	30.4	3.5
740815	0903	4	3.3	30.8	4.7
740815	0904	5	2.0	30.3	11.6
740815	0905	6	0.0	29.6	29.1
740815	0906	7	0.0	29.0	30.2
740815	1225	1	4.4	32.6	2.3
740815	1226	2	4.2	30.9	2.3
740815	1227	3	3.6	30.9	2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-05-D PUNTA GORDA 50' FRM END CANAL #2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740815	1228	4	1.8	30.9	2.4
740815	1229	5	0.9	30.6	4.1
740815	1230	6	0.0	30.6	20.0
740815	1231	7	0.0	29.4	29.0
740814					
NUMBER			51	51	51
MAXIMUM			5.5	32.8	32.4
MINIMUM			0.0	28.8	2.3
MEAN			2.4	30.4	11.3
740815					

APPENDIX B-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-06-D PUNTA GORDA 1000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740814	1450	1	3.1	31.2	5.0
740814	1451	2	2.5	30.2	5.4
740814	1452	3	2.8	30.2	6.7
740814	1453	4	2.8	30.2	7.5
740814	1454	5	2.6	30.3	8.2
740814	1455	6	0.7	29.4	21.8
740814	1456	7	0.0	29.1	31.0
740814	1810	1	4.6	31.5	3.8
740814	1811	2	4.5	31.4	3.9
740814	1812	3	2.5	30.6	5.2
740814	1813	4	2.0	29.8	7.2
740814	1814	5	0.0	29.6	13.4
740814	1815	6	0.0	29.2	29.9
740814	2040	1	4.2	30.6	4.0
740814	2041	2	3.5	30.8	4.3
740814	2042	3	2.5	30.3	5.2
740814	2043	4	1.6	30.0	8.5
740814	2044	5	0.0	29.5	26.0
740814	2045	6	0.0	28.9	31.5
740815	0030	1	4.4	30.0	7.2
740815	0031	2	4.4	30.0	7.4
740815	0032	3	4.0	29.8	7.4
740815	0033	4	2.7	29.9	8.9
740815	0034	5	0.7	29.8	13.7
740815	0035	6	0.0	29.1	33.8
740815	0410	1	3.8	30.2	5.5
740815	0411	2	3.8	30.3	5.7
740815	0412	3	3.7	30.6	6.2
740815	0413	4	3.5	30.8	8.7
740815	0414	5	2.2	30.4	13.1
740815	0415	6	0.0	29.7	33.0
740815	0650	1	3.8	30.1	3.0
740815	0651	2	3.8	30.4	3.1
740815	0652	3	3.6	31.1	4.1
740815	0653	4	2.7	30.7	7.2
740815	0654	5	1.6	30.2	10.6
740815	0655	6	0.0	29.5	29.7
740815	0915	1	3.6	30.2	3.0
740815	0916	2	3.4	30.3	2.9
740815	0917	3	3.3	30.6	3.5
740815	0918	4	3.1	30.8	4.6
740815	0919	5	2.1	30.4	12.6
740815	0920	6	0.0	29.7	28.9
740815	0921	7	0.0	29.3	30.1
740815	1245	1	3.8	31.1	2.5
740815	1246	2	3.2	30.8	2.5
740815	1247	3	2.8	30.5	3.0

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - PG-06-D PUNTA GORDA 1000' FM END CANAL#2

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740815	1248	4	2.7	30.6	4.1
740815	1249	5	2.6	30.7	5.2
740815	1250	6	0.2	30.7	5.8
740815	1251	7	0.0	30.0	29.4
740814					
NUMBER			51	51	51
MAXIMUM			4.6	31.5	33.8
MINIMUM			0.0	28.9	2.5
MEAN			2.3	30.2	11.4
740815					

APPENDIX B-2.1

```
                ENVIRONMENTAL PROTECTION AGENCY  REGION IV
          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
               FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - PG-07-D          PUNTA GORDA 2000' FM END CANAL#2
----------------------------------------------------------------
                      00003        00299        00010        00480
                      DEPTH         DO          WATER      SALINITY
                                   PROBE         TEMP
DATE    TIME           FEET         MG/L         CENT          PPTH

740814 1505              1           3.8         30.6           4.6
740814 1506              2           3.4         30.3           5.2
740814 1507              3           3.2         30.4           5.6
740814 1508              4           3.2         30.6           6.9
740814 1820              1           3.9         30.5           3.8
740814 1821              2           2.8         30.6           4.8
740814 1822              3           2.2         30.6           4.4
740814 1823              4           2.6         30.4           6.5
740814 1824              5           2.6         30.2           8.8
740814 2050              1           4.1         30.2           4.0
740814 2051              2           4.2         30.4           4.2
740814 2052              3           3.8         30.3          10.2
740815 0045              1           3.3         29.8           4.7
740815 0046              2           3.2         29.9           6.4
740815 0047              3           3.2         29.7           6.7
740815 0048              4           3.0         29.7           6.8
740815 0049              5           2.8         29.9          11.2
740815 0420              1           3.6         30.4           5.6
740815 0421              2           3.5         30.4           5.7
740815 0422              3           3.4         30.5           6.0
740815 0423              4           3.0         30.8           9.2
740815 0424              5           2.1         30.8          10.8
740815 0700              1           3.4         30.0           3.0
740815 0701              2           3.3         30.2           2.9
740815 0702              3           3.1         30.2           3.1
740815 0703              4           2.6         30.7           6.5
740815 0704              5           2.2         30.6           8.7
740815 0925              1           3.0         30.3           3.0
740815 0926              2           3.0         30.3           3.0
740815 0927              3           2.8         30.3           3.3
740815 0928              4           2.6         30.5           3.8
740815 0929              5           2.0         30.8           8.6
740815 0930              6           0.0         30.5           9.5
740815 1255              1           3.4         31.9           5.2
740815 1256              2           3.0         30.4           7.0
740815 1257              3           3.0         30.9           8.9
740815 1258              4           2.8         30.8           9.7
740815 1259              5           3.0         30.8           9.8
740815 1300              6           3.2         30.9          10.3

740814
    NUMBER                            39           39            39
    MAXIMUM                          4.2         31.9          11.2
    MINIMUM                          0.0         29.7           2.9
    MEAN                             3.0         30.4           6.4
740815
```

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-08-D   BIG PINE KEY 50' FM END CANAL #3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1340	1	6.5	32.2	35.0
740819	1341	2	6.6	32.2	35.0
740819	1342	3	6.6	32.1	35.1
740819	1343	4	6.8	32.1	35.0
740819	1344	5	6.8	32.0	35.1
740819	1345	6	6.6	32.0	35.0
740819	1346	7	6.7	32.0	35.1
740819	1347	8	6.6	32.1	35.0
740819	1348	9	6.8	32.0	35.1
740819	1349	10	6.7	32.1	35.0
740819	1550	1	6.8	32.3	35.0
740819	1551	2	6.8	32.3	35.0
740819	1552	3	6.9	32.2	35.0
740819	1553	4	6.9	32.2	35.0
740819	1554	5	6.9	32.2	35.0
740819	1555	6	6.9	32.1	35.0
740819	1556	7	7.0	32.1	35.1
740819	1557	8	7.0	32.1	35.1
740819	1558	9	7.1	32.1	35.1
740819	1559	10	7.1	32.1	35.1
740819	2320	1	6.3	30.4	32.3
740819	2321	2	5.9	31.3	31.8
740819	2322	3	5.8	31.7	35.2
740819	2323	4	5.8	31.9	35.0
740819	2324	5	5.8	31.9	35.2
740819	2325	6	5.9	31.9	35.0
740819	2326	7	5.9	31.9	35.2
740819	2327	8	5.9	31.8	35.0
740819	2328	9	5.3	32.0	35.1
740820	0130	1	6.6	29.8	30.3
740820	0131	2	6.6	31.3	34.7
740820	0132	3	6.5	31.7	34.6
740820	0133	4	6.5	31.9	34.4
740820	0134	5	6.6	31.9	34.4
740820	0135	6	6.8	32.0	34.4
740820	0136	7	6.7	32.0	34.4
740820	0137	8	6.2	32.0	34.4
740820	0138	9	5.4	31.9	34.4
740820	0139	10	4.9	31.9	34.5
740820	0420	1	6.4	28.3	26.8
740820	0421	2	6.2	30.5	35.3
740820	0422	3	6.2	31.5	35.6
740820	0423	4	6.2	31.4	35.7
740820	0424	5	6.2	31.6	35.5
740820	0425	6	6.2	31.9	35.3
740820	0426	7	6.2	32.0	35.2
740820	0427	8	6.1	32.0	35.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-08-D   BIG PINE KEY 50' FM END CANAL #3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	0428	9	5.3	31.9	35.3
740820	0429	10	4.8	31.9	35.3
740820	0735	1	6.1	29.4	31.9
740820	0736	2	6.0	30.9	36.0
740820	0737	3	6.1	31.4	35.7
740820	0738	4	6.1	31.7	35.4
740820	0739	5	6.0	31.9	35.3
740820	0740	6	6.0	32.0	35.3
740820	0741	7	5.7	32.0	35.3
740820	0742	8	5.2	32.0	35.3
740820	0743	9	4.5	32.0	35.3
740820	0940	1	6.2	30.7	34.0
740820	0941	2	6.1	31.5	35.7
740820	0942	3	6.2	31.7	35.5
740820	0943	4	6.2	31.9	35.4
740820	0944	5	6.1	31.9	35.4
740820	0945	6	6.1	32.1	35.3
740820	0946	7	6.0	32.1	35.2
740820	0947	8	5.6	32.2	35.2
740820	0948	9	4.5	32.1	35.2
740820	1305	1	6.0	31.9	35.2
740820	1306	2	6.2	32.0	35.2
740820	1307	3	5.9	32.0	35.2
740820	1308	4	5.9	32.0	35.1
740820	1309	5	6.1	32.0	35.0
740820	1310	6	6.1	32.1	35.0
740820	1311	7	6.1	32.1	35.0
740820	1312	8	4.8	32.2	35.0
740820	1313	9	4.8	32.2	35.0
740819					
NUMBER			76	76	76
MAXIMUM			7.1	32.3	36.0
MINIMUM			4.5	28.3	26.8
MEAN			6.2	31.8	34.8
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-09-D BIG PINE KEY 780' FM END CANAL#3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1355	1	5.9	32.2	35.0
740819	1356	2	6.0	32.2	35.0
740819	1357	3	6.0	32.2	35.0
740819	1358	4	6.0	32.1	35.0
740819	1359	5	6.0	32.1	35.1
740819	1400	6	6.0	31.6	35.3
740819	1401	7	6.0	31.6	35.3
740819	1402	8	6.0	31.5	35.4
740819	1403	9	6.0	31.5	35.4
740819	1602	1	6.0	32.5	34.8
740819	1603	2	6.0	32.5	34.9
740819	1604	3	6.0	32.4	34.9
740819	1605	4	6.0	32.3	34.9
740819	1606	5	6.0	32.2	35.0
740819	1607	6	6.1	32.0	35.1
740819	1608	7	6.4	31.8	35.2
740819	1609	8	7.2	31.8	35.2
740819	2330	1	5.8	31.0	34.1
740819	2331	2	5.7	32.1	33.7
740819	2332	3	5.7	31.6	33.6
740819	2333	4	5.7	32.0	33.5
740819	2334	5	5.8	32.1	33.5
740819	2335	6	6.1	31.9	33.6
740819	2336	7	6.0	31.9	34.2
740819	2337	8	5.8	31.8	35.2
740819	2338	9	5.7	31.7	35.1
740820	0145	1	6.5	30.1	33.3
740820	0146	2	6.2	31.3	35.2
740820	0147	3	6.4	31.7	35.2
740820	0148	4	6.4	31.9	35.1
740820	0149	5	6.5	32.1	35.1
740820	0150	6	6.6	32.0	35.2
740820	0151	7	6.7	32.0	35.2
740820	0152	8	6.7	31.9	35.3
740820	0153	9	6.1	31.8	35.3
740820	0430	1	6.0	29.8	33.1
740820	0431	2	5.7	30.8	35.4
740820	0432	3	5.4	31.0	35.7
740820	0433	4	5.3	31.3	35.7
740820	0434	5	5.7	31.6	35.5
740820	0435	6	6.0	32.0	35.2
740820	0436	7	6.2	32.0	35.2
740820	0437	8	6.1	32.0	35.2
740820	0438	9	5.3	31.9	35.3
740820	0745	1	5.8	30.3	34.4
740820	0746	2	5.3	30.9	35.3
740820	0747	3	5.0	31.1	35.8

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-09-D BIG PINE KEY 780' FM END CANAL#3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	0748	4	5.2	31.3	35.7
740820	0749	5	5.8	31.7	35.4
740820	0750	6	5.8	32.1	35.2
740820	0751	7	5.9	32.0	35.3
740820	0752	8	4.7	31.9	35.3
740820	0950	1	6.0	30.8	34.7
740820	0951	2	5.7	31.0	35.8
740820	0952	3	5.2	31.1	35.8
740820	0953	4	5.1	31.4	35.6
740820	0954	5	5.5	31.6	35.5
740820	0955	6	5.8	32.1	35.3
740820	0956	7	5.7	32.1	35.2
740820	0957	8	5.0	32.1	35.3
740820	1330	1	4.9	31.7	35.3
740820	1331	2	4.6	31.6	35.4
740820	1332	3	4.5	31.5	35.5
740820	1333	4	4.2	31.2	35.6
740820	1334	5	4.3	31.0	35.8
740820	1335	6	4.8	31.3	35.5
740820	1336	7	5.6	32.0	35.1
740820	1337	8	5.9	32.2	35.1
740820	1338	9	6.0	32.1	35.1
740819					
NUMBER			69	69	69
MAXIMUM			7.2	32.5	35.8
MINIMUM			4.2	29.8	33.1
MEAN			5.8	31.7	35.0
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-10-D BIG PINE KEY 1560' FM END CANL#3

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1405	1	5.7	32.3	34.9
740819	1406	2	5.8	32.2	35.0
740819	1407	3	5.8	32.2	35.0
740819	1408	4	5.6	32.1	35.1
740819	1409	5	5.5	32.0	35.2
740819	1410	6	5.6	31.8	35.2
740819	1411	7	6.2	31.8	35.3
740819	1412	8	6.2	31.6	35.3
740819	1413	9	6.7	31.7	35.3
740819	1612	1	7.1	32.9	34.7
740819	1613	2	6.8	32.7	34.7
740819	1614	3	6.4	32.8	34.7
740819	1615	4	6.4	32.6	34.7
740819	1616	5	5.9	32.5	34.8
740819	1617	6	5.8	32.0	35.1
740819	1618	7	5.9	31.9	35.2
740819	1619	8	7.8	31.8	35.2
740819	1620	9	8.0	31.8	35.3
740819	2340	1	5.7	31.1	36.0
740819	2341	2	5.9	31.2	35.5
740819	2342	3	5.7	31.8	35.2
740819	2343	4	5.7	31.9	35.2
740819	2344	5	5.7	31.9	35.0
740819	2345	6	6.2	31.9	35.2
740819	2346	7	6.2	31.8	35.2
740819	2347	8	5.7	31.7	35.2
740820	0210	1	5.9	30.9	35.1
740820	0211	2	5.5	31.0	35.8
740820	0212	3	5.4	31.2	35.6
740820	0213	4	5.7	31.5	35.4
740820	0214	5	6.3	31.9	35.2
740820	0215	6	6.7	32.0	35.2
740820	0216	7	6.8	31.9	35.3
740820	0217	8	5.7	31.8	35.3
740820	0445	1	4.6	29.8	33.5
740820	0446	2	4.2	29.6	34.2
740820	0447	3	4.7	30.8	35.9
740820	0448	4	5.1	31.0	35.8
740820	0449	5	5.1	31.4	35.5
740820	0450	6	5.3	31.6	35.5
740820	0451	7	6.1	31.9	35.2
740820	0452	8	6.2	32.0	35.3
740820	0453	9	5.6	31.7	35.4
740820	0800	1	4.8	29.9	33.7
740820	0801	2	4.8	30.5	35.5
740820	0802	3	4.5	30.5	35.5
740820	0803	4	4.8	31.1	35.2
740820	0804	5	5.1	31.6	35.5
740820	0805	6	5.6	31.8	35.3
740820	0806	7	5.3	31.9	35.3
740820	0807	8	5.0	31.8	35.4
740820	1000	1	5.3	30.3	33.4
740820	1001	2	5.2	30.7	35.0
740820	1002	3	4.9	30.7	36.1
740820	1003	4	5.0	31.0	36.0
740820	1004	5	5.4	31.5	35.6
740820	1005	6	6.0	31.8	35.4
740820	1006	7	6.0	32.1	35.2
740820	1007	8	5.5	32.0	35.2
740820	1340	1	4.8	31.6	35.4
740820	1341	2	4.5	31.5	35.4
740820	1342	3	4.9	31.3	35.6
740820	1343	4	4.9	31.2	35.7
740820	1344	5	4.8	31.1	35.7
740820	1345	6	4.6	31.1	35.7
740820	1346	7	5.3	31.5	35.4
740820	1347	8	6.9	32.0	35.2
740820	1348	9	7.2	32.2	35.0
740819					
NUMBER			68	68	68
MAXIMUM			8.0	32.9	36.1
MINIMUM			4.2	29.6	33.4
MEAN			5.7	31.6	35.2
740820					

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-10-D BIG PINE KEY 1560' FM END CANL#3

APPENDIX B-2.2

```
               ENVIRONMENTAL PROTECTION AGENCY  REGION IV
           SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                 FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - BPK-11-D        BOGIE CHANNEL BACKGROUND STATION
------------------------------------------------------------
                    00003      00299      00010      00480
                    DEPTH       DO        WATER     SALINITY
                               PROBE      TEMP
DATE    TIME        FEET       MG/L       CENT        PPTH

740819 1415           1         6.5       32.4        34.9
740819 1416           2         6.6       32.4        34.9
740819 1417           3         6.6       32.4        34.9
740819 1622           1         7.3       32.4        34.8
740819 1623           2         7.3       32.4        34.8
740819 1624           3         7.3       32.4        34.9
740819 2350           1         5.5       30.9        35.5
740819 2351           2         5.5       30.9        35.5
740819 2352           3         5.5       31.1        35.4
740820 0230           1         5.8       31.0        35.8
740820 0231           2         5.8       31.0        35.8
740820 0232           3         5.7       31.0        35.8
740820 0500           1         4.8       30.5        36.1
740820 0501           2         4.7       30.5        36.1
740820 0502           3         4.7       30.5        36.1
740820 0810           1         4.6       30.3        36.3
740820 0811           2         4.6       30.4        36.3
740820 0812           3         4.6       30.4        36.3
740820 1010           1         5.1       30.7        36.1
740820 1011           2         5.1       30.7        36.1
740820 1350           1         5.0       31.6        35.3
740820 1351           2         5.0       31.7        35.3
740820 1352           3         5.0       31.7        35.3
740820 1353           4         5.0       31.7        35.3

740819
    NUMBER                       24         24          24
    MAXIMUM                     7.3       32.4        36.3
    MINIMUM                     4.6       30.3        34.8
    MEAN                        5.6       31.3        35.6
740820
```

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-12-D   BIG PINE KEY 50' FM END CANAL #4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1435	1	3.6	33.4	34.4
740819	1436	2	3.3	33.0	34.6
740819	1437	3	3.4	32.7	34.7
740819	1438	4	3.4	32.5	34.7
740819	1439	5	3.4	32.5	34.8
740819	1441	6	3.4	32.4	34.8
740819	1441	7	3.4	32.3	34.8
740819	1442	8	3.5	32.4	34.9
740819	1443	9	3.4	32.3	34.9
740819	1640	1	4.3	33.0	34.5
740819	1641	2	4.3	32.9	34.5
740819	1642	3	4.2	32.9	34.5
740819	1643	4	4.0	32.7	34.7
740819	1644	5	3.9	32.5	34.8
740819	1645	6	3.9	32.5	34.8
740819	1646	7	4.2	32.4	34.8
740819	1647	8	4.2	32.4	34.8
740820	0015	1	5.0	31.8	35.3
740820	0016	2	4.9	32.2	34.9
740820	0017	3	4.9	32.2	34.9
740820	0018	4	4.9	32.5	34.7
740820	0019	5	4.2	32.4	34.9
740820	0020	6	4.0	32.7	34.9
740820	0021	7	3.6	32.4	35.0
740820	0022	8	3.0	32.2	34.9
740820	0023	9	2.8	32.1	34.9
740820	0255	1	5.5	30.3	31.7
740820	0256	2	5.4	31.9	35.3
740820	0257	3	5.4	32.0	35.0
740820	0258	4	5.3	32.4	34.9
740820	0259	5	5.0	32.6	34.9
740820	0400	6	4.4	32.4	35.0
740820	0401	7	4.0	32.2	35.1
740820	0402	8	3.7	32.3	35.1
740820	0403	9	2.9	32.1	35.2
740820	0520	1	5.3	30.1	34.0
740820	0521	2	5.2	31.3	35.6
740820	0522	3	5.1	31.7	35.4
740820	0523	4	5.1	31.9	35.3
740820	0524	5	4.9	32.3	34.9
740820	0525	6	4.2	32.6	34.9
740820	0526	7	4.0	32.4	35.0
740820	0527	8	2.6	32.3	35.0
740820	0830	1	5.4	30.6	34.2
740820	0831	2	5.3	31.7	35.4
740820	0832	3	5.2	32.2	35.2
740820	0833	4	5.2	32.3	35.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-12-D   BIG PINE KEY 50' FM END CANAL #4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	0834	5	3.1	32.5	35.0
740820	0835	6	2.9	32.4	35.0
740820	0836	7	2.8	32.2	35.2
740820	0837	3	2.7	32.0	35.3
740820	1030	1	5.0	31.9	35.3
740820	1031	2	4.9	32.1	35.2
740820	1032	3	5.0	32.2	35.0
740820	1033	4	4.8	32.5	34.9
740820	1034	5	4.4	32.7	34.8
740820	1035	6	3.2	32.8	34.8
740820	1036	7	2.7	32.6	34.9
740820	1037	8	2.5	32.3	35.0
740820	1430	1	4.3	32.8	34.6
740820	1431	2	4.2	32.8	34.8
740820	1432	3	3.9	32.3	35.0
740820	1433	4	4.4	32.3	35.0
740820	1434	5	4.4	32.6	34.7
740820	1435	6	3.1	32.8	34.7
740820	1436	7	2.2	32.8	34.6
740820	1437	8	1.1	32.6	34.8
740819					
NUMBER			67	67	67
MAXIMUM			5.5	33.4	35.6
MINIMUM			1.1	30.1	31.7
MEAN			4.1	32.3	34.9
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-13-D BIG PINE KEY 360' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1445	1	4.2	33.7	34.1
740819	1446	2	4.4	33.4	34.5
740819	1447	3	5.0	32.8	34.7
740819	1448	4	5.6	32.6	34.8
740819	1449	5	5.6	32.6	34.8
740819	1450	6	5.5	32.5	34.8
740819	1451	7	5.5	32.5	34.8
740819	1452	8	5.5	32.6	34.8
740819	1650	1	4.8	33.1	34.4
740819	1651	2	4.8	33.2	34.5
740819	1652	3	4.8	33.1	34.4
740819	1653	4	6.4	33.0	34.5
740819	1654	5	6.4	32.7	34.8
740819	1655	6	6.4	32.6	34.7
740819	1656	7	6.4	32.6	34.8
740819	1657	8	6.4	32.5	34.8
740820	0025	1	5.3	31.1	35.6
740820	0026	2	5.2	31.5	35.2
740820	0027	3	5.2	32.2	35.0
740820	0028	4	5.1	32.4	34.7
740820	0029	5	4.7	32.6	34.7
740820	0030	6	4.6	32.5	34.7
740820	0031	7	3.8	32.3	34.8
740820	0310	1	5.5	30.7	34.7
740820	0311	2	5.3	31.5	35.5
740820	0312	3	5.3	31.7	35.2
740820	0313	4	5.3	32.3	35.1
740820	0314	5	5.5	32.3	35.0
740820	0315	6	4.3	32.6	34.9
740820	0316	7	3.8	32.5	35.0
740820	0317	8	3.8	32.4	35.0
740820	0530	1	5.1	30.5	32.0
740820	0531	2	4.5	31.1	35.7
740820	0532	3	4.6	31.3	35.6
740820	0533	4	4.8	31.8	35.4
740820	0534	5	4.8	32.1	35.2
740820	0535	6	4.2	32.6	34.8
740820	0536	7	3.7	32.3	35.0
740820	0840	1	5.3	30.8	35.0
740820	0841	2	4.9	31.2	35.7
740820	0842	3	4.9	31.4	35.6
740820	0843	4	4.4	32.0	35.2
740820	0844	5	3.6	32.4	35.0
740820	0845	6	2.9	32.5	35.0
740820	0846	7	2.7	32.1	35.2
740820	1040	1	4.2	31.6	34.9
740820	1041	2	4.3	31.7	35.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-13-D BIG PINE KEY 360' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	1042	3	4.2	31.7	35.4
740820	1043	4	4.3	32.0	35.3
740820	1044	5	4.2	32.3	35.1
740820	1045	6	3.8	32.6	34.9
740820	1046	7	3.1	32.7	34.9
740820	1420	1	4.1	32.5	34.9
740820	1421	2	3.5	32.1	35.2
740820	1422	3	3.6	31.6	35.4
740820	1423	4	3.5	31.6	35.3
740820	1424	5	3.5	32.1	35.0
740820	1425	6	3.0	32.3	35.0
740820	1426	7	2.8	32.8	34.6
740820	1427	8	2.7	32.8	34.6
740819					
NUMBER			60	60	60
MAXIMUM			6.4	33.7	35.7
MINIMUM			2.7	30.5	32.0
MEAN			4.6	32.2	34.9
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-14-D BIG PINE KEY 725' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROHE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1500	1	4.4	32.9	34.5
740819	1501	2	4.3	32.8	34.6
740819	1502	3	4.3	32.9	34.6
740819	1503	4	4.3	32.7	34.7
740819	1504	5	4.4	32.7	34.9
740819	1505	6	4.7	32.3	35.0
740819	1506	7	4.7	32.1	35.0
740819	1700	1	4.8	32.9	34.5
740819	1701	2	4.8	33.0	34.4
740819	1702	3	4.8	33.0	34.5
740819	1703	4	4.8	32.9	34.4
740819	1704	5	5.4	32.7	34.4
740819	1705	6	4.8	32.4	34.8
740819	1706	7	4.9	32.2	35.0
740820	0035	1	5.0	30.9	35.6
740820	0036	2	5.0	31.0	35.6
740820	0037	3	5.1	31.8	35.0
740820	0038	4	5.0	32.0	35.0
740820	0039	5	5.0	32.0	34.9
740820	0040	6	4.9	32.3	34.9
740820	0041	7	4.5	32.3	34.8
740820	0325	1	5.0	30.7	35.3
740820	0326	2	4.8	30.9	35.9
740820	0327	3	5.1	31.4	35.5
740820	0328	4	5.3	31.7	35.3
740820	0329	5	5.4	32.4	35.0
740820	0330	6	5.1	32.4	35.0
740820	0331	7	4.4	32.5	35.0
740820	0332	8	3.9	32.2	35.0
740820	0540	1	4.5	30.1	33.2
740820	0541	2	4.2	30.9	35.8
740820	0542	3	4.3	31.0	35.8
740820	0543	4	4.9	31.7	35.4
740820	0544	5	5.0	32.2	35.1
740820	0545	6	4.4	32.4	34.9
740820	0546	7	3.3	32.4	35.1
740820	0547	8	3.1	32.1	35.2
740820	0855	1	4.9	30.9	35.7
740820	0856	2	4.4	31.0	35.9
740820	0857	3	4.9	31.5	35.5
740820	0858	4	5.0	32.1	35.2
740820	0859	5	4.4	32.5	34.9
740820	0900	6	3.8	32.5	35.0
740820	0901	7	3.2	32.2	35.2
740820	0902	8	2.9	31.9	35.4
740820	1050	1	4.1	31.5	35.6
740820	1051	2	4.0	31.4	35.6

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-14-D BIG PINE KEY 725' FM END CANAL#4

DATE	TIME	00003 DEPTH FEET	00299 DO PROHE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	1052	3	3.8	31.4	35.6
740820	1053	4	3.8	31.3	35.7
740820	1054	5	4.0	31.5	35.6
740820	1055	6	4.1	32.0	35.2
740820	1056	7	3.8	32.5	35.0
740820	1057	8	2.7	32.5	35.0
740820	1058	9	2.5	32.4	35.0
740820	1440	1	4.0	32.2	35.1
740820	1441	2	4.0	31.9	35.0
740820	1442	3	4.9	32.0	35.1
740820	1443	4	4.2	31.7	35.2
740820	1444	5	3.8	31.5	35.3
740820	1445	6	3.8	31.9	35.2
740820	1446	7	3.6	32.5	34.7
740819					
NUMBER			61	61	61
MAXIMUM			5.4	33.0	35.9
MINIMUM			2.5	30.1	33.2
MEAN			4.4	32.0	35.1
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-F-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1425	1	4.0	32.8	34.6
740819	1426	2	4.1	32.8	34.8
740819	1427	3	4.2	32.8	34.7
740819	1428	4	4.2	32.8	34.7
740819	1429	5	4.0	32.6	34.8
740819	1430	6	4.2	32.4	34.8
740819	1431	7	4.5	32.5	34.9
740819	1432	8	4.5	32.4	34.8
740819	1630	1	4.8	33.1	34.5
740819	1631	2	4.7	33.1	34.5
740819	1632	3	5.0	33.1	34.6
740819	1633	4	5.0	32.7	34.7
740819	1634	5	4.9	32.6	34.8
740819	1635	6	4.7	32.5	34.8
740819	1636	7	4.8	32.5	34.8
740819	1637	8	4.9	32.4	34.8
740819	2400	1	5.3	31.1	35.0
740820	0001	2	5.0	32.0	34.9
740820	0002	3	5.0	32.2	34.7
740820	0003	4	4.9	32.4	34.7
740820	0004	5	4.9	32.5	34.6
740820	0005	6	4.3	32.5	34.9
740820	0006	7	3.4	32.4	34.8
740820	0007	8	3.2	32.2	35.0
740820	0240	1	5.7	31.1	32.5
740820	0241	2	5.5	31.9	35.3
740820	0242	3	5.7	32.0	35.2
740820	0243	4	5.6	32.3	35.1
740820	0244	5	5.5	32.5	34.9
740820	0245	6	5.2	32.5	34.9
740820	0246	7	4.1	32.3	35.1
740820	0247	8	3.3	32.0	35.2
740820	0505	1	5.4	31.4	35.1
740820	0506	2	5.3	31.9	35.4
740820	0507	3	5.2	31.9	35.3
740820	0508	4	5.3	31.9	35.3
740820	0509	5	5.1	32.4	35.0
740820	0510	6	4.4	32.5	35.0
740820	0511	7	3.6	32.3	35.0
740820	0820	1	5.3	31.5	35.6
740820	0821	2	5.1	31.8	35.5
740820	0822	3	5.1	32.0	35.2
740820	0823	4	5.0	32.5	35.0
740820	0824	5	4.7	32.5	35.0
740820	0825	6	3.2	32.3	35.1
740820	0826	7	3.4	31.9	35.3
740820	1018	1	5.1	32.0	35.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-F-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	1019	2	5.0	32.0	35.3
740820	1020	3	5.2	32.2	35.2
740820	1021	4	5.1	32.5	35.0
740820	1022	5	4.3	32.5	35.0
740820	1023	6	3.8	32.7	34.9
740820	1024	7	3.2	32.4	35.0
740820	1025	8	2.8	31.9	35.3
740820	1405	1	4.8	32.6	34.6
740820	1406	2	4.5	32.5	34.7
740820	1407	3	4.4	32.5	34.7
740820	1408	4	4.6	32.5	34.7
740820	1409	5	4.5	32.5	34.7
740820	1410	6	3.9	32.8	34.6
740820	1411	7	2.6	32.7	34.6
740820	1412	8	1.7	32.4	34.8
740819					
NUMBER			62	62	62
MAXIMUM			5.7	33.1	35.6
MINIMUM			1.7	31.1	32.5
MEAN			4.5	32.3	34.9
740820					

APPENDIX B-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-G-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740819	1508	1	2.5	32.5	34.8
740819	1509	2	2.2	32.6	34.7
740819	1510	3	1.8	32.6	34.8
740819	1511	4	0.8	32.3	34.9
740819	1512	5	0.6	32.1	35.0
740819	1513	6	0.7	32.1	35.1
740819	1514	7	0.8	32.0	35.1
740819	1710	1	3.6	32.7	34.6
740819	1711	2	3.5	32.9	34.5
740819	1712	3	3.2	32.9	34.5
740819	1713	4	2.8	32.8	34.7
740819	1714	5	2.2	32.6	34.8
740819	1715	6	2.0	32.5	34.8
740819	1716	7	1.9	32.3	35.0
740819	1717	8	1.8	32.3	35.1
740820	0045	1	5.0	31.2	35.5
740820	0046	2	5.1	31.2	35.5
740820	0047	3	5.0	31.3	35.5
740820	0048	4	5.0	31.3	35.5
740820	0049	5	4.2	31.4	35.4
740820	0050	6	2.9	31.9	35.1
740820	0051	7	2.6	32.4	34.9
740820	0335	1	5.1	31.0	36.0
740820	0336	2	5.1	31.2	35.6
740820	0337	3	5.3	31.4	35.6
740820	0338	4	5.3	31.6	35.5
740820	0339	5	3.9	32.5	35.1
740820	0340	6	3.9	32.4	35.0
740820	0341	7	4.2	32.3	35.0
740820	0342	8	3.5	32.2	35.1
740820	0343	9	3.5	32.2	35.1
740820	0550	1	5.0	30.5	36.0
740820	0551	2	4.9	31.1	35.8
740820	0552	3	4.8	31.2	35.7
740820	0553	4	5.1	31.3	35.6
740820	0554	5	3.5	32.4	35.1
740820	0555	6	3.8	32.4	35.0
740820	0556	7	3.4	32.3	35.0
740820	0557	8	3.0	32.0	35.2
740820	0558	9	2.6	32.0	35.2
740820	0905	1	5.1	31.0	36.0
740820	0906	2	5.1	31.5	35.6
740820	0907	3	5.2	31.7	35.5
740820	0908	4	5.0	32.1	35.3
740820	0909	5	4.7	32.4	35.1
740820	0910	6	4.3	32.6	35.0
740820	0911	7	4.6	32.6	35.0

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - BPK-G-D BIG PINE KEY SPECIAL STATION

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740820	0912	8	3.1	32.5	35.0
740820	0913	9	2.9	32.0	35.3
740820	1100	1	4.1	31.8	35.4
740820	1101	2	4.2	31.9	35.3
740820	1102	3	4.4	32.1	35.2
740820	1103	4	4.1	32.1	35.2
740820	1104	5	3.8	32.2	35.1
740820	1105	6	3.0	32.5	35.0
740820	1106	7	3.2	32.7	34.9
740820	1107	8	2.5	32.7	34.9
740820	1108	9	2.2	32.5	35.0
740820	1109	10	2.0	32.3	35.1
740820	1450	1	3.7	32.3	35.0
740820	1451	2	3.7	32.3	35.0
740820	1452	3	3.8	32.2	35.0
740820	1453	4	3.4	32.2	35.0
740820	1454	5	1.2	32.0	35.1
740820	1455	6	0.5	32.6	34.8
740820	1456	7	0.4	32.6	34.8
740819					
NUMBER			66	66	66
MAXIMUM			5.3	32.9	36.0
MINIMUM			0.4	30.5	34.5
MEAN			3.4	32.1	35.2
740820					

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-15-D 50' FROM DEAD END OF CANAL VI

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740822	1845	1	5.3	30.8	36.0
740822	1846	2	5.2	30.8	35.9
740822	1847	3	5.2	30.8	35.9
740822	1848	4	5.1	30.8	35.9
740822	1849	5	4.9	31.5	35.8
740822	1850	6	3.6	32.1	35.0
740822	1851	7	3.4	32.0	35.1
740822	1852	8	3.5	32.1	35.1
740822	1853	9	3.7	32.0	35.0
740822	1854	10	3.7	32.0	35.1
740822	1855	11	3.7	32.1	35.1
740822	1856	12	3.7	32.1	35.1
740822	1857	13	3.8	32.0	35.1
740822	1858	14	3.8	32.1	35.1
740822	1859	15	3.8	32.1	35.0
740822	1900	16	3.8	32.0	35.1
740822	2140	1	5.2	30.5	36.2
740822	2141	2	5.2	30.5	36.2
740822	2142	3	5.2	30.5	36.2
740822	2143	4	5.1	30.5	36.2
740822	2144	5	5.1	30.5	36.2
740822	2145	6	5.1	30.5	36.2
740822	2146	7	4.7	30.6	35.8
740822	2147	8	3.7	31.6	35.3
740822	2148	9	3.7	32.0	35.3
740822	2149	10	3.7	32.0	35.1
740822	2150	11	3.7	32.1	35.1
740822	2151	12	3.7	32.1	35.1
740822	2152	13	3.7	32.1	35.1
740822	2153	14	3.6	32.1	35.1
740822	2154	15	3.2	32.1	35.1
740822	2155	16	3.2	32.1	35.1
740822	2330	1	5.2	30.3	36.4
740822	2331	2	5.2	30.4	36.4
740822	2332	3	5.1	30.4	36.3
740822	2333	4	5.1	30.4	36.3
740822	2334	5	5.1	30.4	36.2
740822	2335	6	5.2	30.7	36.1
740822	2336	7	4.4	31.1	35.8
740822	2337	8	4.0	31.6	35.5
740822	2338	9	3.6	31.9	35.2
740822	2339	10	3.8	32.1	35.1
740822	2400	11	3.7	32.1	35.2
740823	0001	12	3.6	32.1	35.1
740823	0002	13	3.6	32.0	35.2
740823	0003	14	3.5	32.1	35.2
740823	0004	15	3.2	32.1	35.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-15-D 50' FROM DEAD END OF CANAL VI

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0315	1	4.6	30.0	36.5
740823	0316	2	4.4	30.0	36.6
740823	0317	3	4.0	30.0	36.6
740823	0318	4	3.9	31.7	36.2
740823	0319	5	1.6	31.6	35.9
740823	0320	6	2.1	31.6	35.5
740823	0321	7	2.6	32.1	35.3
740823	0322	8	2.4	32.1	35.1
740823	0323	9	2.2	32.2	35.3
740823	0324	10	2.8	32.2	35.2
740823	0325	11	2.6	32.2	35.2
740823	0326	12	2.5	32.2	35.3
740823	0327	13	2.6	32.1	35.2
740823	0328	14	1.9	32.2	35.6
740823	0329	15	1.4	32.1	35.3
740823	0715	1	4.0	30.3	36.5
740823	0716	2	3.7	30.2	36.4
740823	0717	3	3.5	30.7	35.8
740823	0718	4	3.2	31.0	35.9
740823	0719	5	2.5	31.3	35.7
740823	0720	6	2.6	32.0	35.3
740823	0721	7	2.7	32.0	35.3
740823	0722	8	2.5	32.1	35.3
740823	0723	9	2.4	32.0	35.3
740823	0724	10	2.8	32.0	35.3
740823	0725	11	2.6	32.0	35.4
740823	0726	12	2.4	31.9	35.4
740823	0727	13	2.4	32.0	35.3
740823	0728	14	2.4	32.0	35.3
740823	0729	15	2.4	32.0	35.4
740823	0730	16	2.4	31.9	35.4
740823	1000	1	3.7	30.3	36.2
740823	1001	2	3.8	30.4	36.2
740823	1002	3	3.5	30.6	36.1
740823	1003	4	3.3	31.7	35.3
740823	1004	5	2.3	31.6	35.5
740823	1005	6	2.3	31.7	35.3
740823	1006	7	2.5	31.8	35.3
740823	1007	8	2.7	31.7	35.4
740823	1008	9	2.9	31.6	35.4
740823	1009	10	3.1	31.4	35.5
740823	1010	11	3.0	31.5	35.5
740823	1011	12	2.9	31.5	35.5
740823	1012	13	2.8	31.6	35.4
740823	1013	14	2.7	31.6	35.4
740823	1014	15	2.7	31.7	35.4
740823	1015	16	2.8	31.7	35.4

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-15-D   50' FROM DEAD END OF CANAL VI

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	1300	1	4.8	30.8	35.9
740823	1301	2	4.5	30.8	35.8
740823	1302	3	4.4	30.9	35.8
740823	1303	4	3.4	31.1	35.7
740823	1304	5	3.4	31.6	35.4
740823	1305	6	3.2	31.8	35.3
740823	1306	7	3.0	31.9	35.1
740823	1307	8	2.4	32.0	35.1
740823	1308	9	2.6	32.1	35.1
740823	1309	10	2.5	32.0	35.2
740823	1310	11	2.5	32.0	35.2
740823	1311	12	2.7	32.0	35.2
740823	1312	13	3.1	31.9	35.2
740823	1313	14	3.2	31.9	35.2
740823	1314	15	3.2	31.9	35.2
740823	1315	16	3.3	31.9	35.2
740823	1640	1	5.0	31.2	35.7
740823	1641	2	5.0	31.3	35.6
740823	1642	3	4.5	31.5	35.4
740823	1643	4	2.3	31.8	35.3
740823	1644	5	3.0	32.0	35.2
740823	1645	6	2.8	32.1	35.1
740823	1646	7	2.9	32.1	35.1
740823	1647	8	2.7	32.1	35.1
740823	1648	9	2.8	32.1	35.1
740823	1649	10	2.3	32.0	35.1
740823	1650	11	2.4	32.0	35.2
740823	1651	12	2.8	32.0	35.2
740823	1815	1	5.1	30.8	35.9
740823	1816	2	4.6	30.9	35.8
740823	1817	3	4.4	31.4	35.6
740823	1818	4	2.5	31.4	35.5
740823	1819	5	2.4	31.8	35.2
740823	1820	6	2.3	31.9	35.2
740823	1821	7	2.1	31.9	35.2
740823	1822	8	2.0	31.9	35.2
740823	1823	9	2.2	31.9	35.2
740823	1824	10	2.6	31.9	35.2
740823	1825	11	3.0	32.0	35.2
740823	1826	12	3.3	31.9	35.2
740823	1827	13	3.3	32.0	35.2
740822					
NUMBER			135	135	135
MAXIMUM			5.3	32.2	36.6
MINIMUM			1.4	30.0	35.0
MEAN			3.4	31.6	35.5
740823					

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-16-D 50' FROM DEAD END OF CANAL VII

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740822	1930	1	3.2	31.8	35.3
740822	1931	2	3.2	31.9	35.3
740822	1932	3	3.2	32.0	35.2
740822	1933	4	3.2	31.9	35.2
740822	1934	5	3.1	31.8	35.2
740822	1935	6	3.1	31.9	35.2
740822	1936	7	3.1	31.9	35.2
740822	1937	8	3.1	31.9	35.2
740822	1938	9	3.1	31.9	35.2
740822	1939	10	3.1	31.9	35.3
740822	1940	11	3.1	31.9	35.2
740822	1941	12	3.1	32.0	35.2
740822	1942	13	3.1	32.0	35.3
740822	1943	14	3.1	32.0	35.2
740822	1944	15	3.1	31.9	35.2
740822	1945	16	3.1	32.0	35.2
740822	1946	17	3.1	32.0	35.2
740822	1947	18	3.1	32.0	35.2
740822	1948	19	3.1	31.9	35.2
740822	1949	20	3.1	32.0	35.2
740822	1950	21	3.1	32.0	35.2
740822	1951	22	3.0	31.9	35.2
740822	1952	23	3.0	31.9	35.1
740822	2157	1	4.6	31.0	35.8
740822	2158	2	4.5	31.0	35.8
740822	2159	3	4.5	31.0	36.0
740822	2200	4	4.5	31.0	36.0
740822	2201	5	4.5	31.0	36.0
740822	2202	6	4.0	31.0	36.0
740822	2203	7	3.8	31.2	36.0
740822	2204	8	3.6	31.6	35.3
740822	2205	9	3.5	31.6	35.3
740823	0005	1	4.4	30.9	35.9
740823	0006	2	4.4	30.9	35.9
740823	0007	3	4.4	30.9	35.8
740823	0008	4	4.4	31.0	35.8
740823	0009	5	4.3	30.9	35.8
740823	0010	6	4.1	31.0	35.8
740823	0011	7	4.0	31.1	35.6
740823	0012	8	3.2	31.4	35.5
740823	0013	9	3.0	31.6	35.4
740823	0014	10	3.0	31.7	35.3
740823	0015	11	2.5	31.8	35.3
740823	0016	12	2.2	31.8	35.2
740823	0017	13	2.2	31.8	35.3
740823	0018	14	2.6	31.8	35.3
740823	0019	15	2.5	31.8	35.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-16-D 50' FROM DEAD END OF CANAL VII

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0020	16	2.5	31.8	35.3
740823	0021	17	2.7	31.8	35.3
740823	0022	18	2.6	31.8	35.3
740823	0023	19	2.2	31.8	35.3
740823	0024	20	2.4	31.8	35.3
740823	0025	21	2.2	31.8	35.3
740823	0026	22	2.3	31.8	35.2
740823	0027	23	2.3	31.8	35.3
740823	0335	1	1.4	31.7	35.6
740823	0336	2	1.5	31.6	35.6
740823	0337	3	1.4	31.7	35.5
740823	0338	4	1.4	31.8	35.5
740823	0339	5	1.3	31.8	35.4
740823	0340	6	1.2	31.8	35.4
740823	0341	7	1.3	31.8	35.5
740823	0342	8	1.2	31.7	35.5
740823	0343	9	1.2	31.7	35.5
740823	0344	10	1.2	31.8	35.5
740823	0345	11	1.2	31.8	35.5
740823	0346	12	1.2	31.7	35.5
740823	0347	13	1.2	31.7	35.5
740823	0348	14	1.3	31.8	35.5
740823	0349	15	1.3	31.7	35.4
740823	0350	16	1.2	31.8	35.5
740823	0351	17	1.2	31.8	35.5
740823	0352	18	1.3	31.8	35.5
740823	0353	19	1.2	31.7	35.5
740823	0354	20	0.9	31.8	35.5
740823	0355	21	0.6	31.6	35.6
740823	0750	1	2.2	31.1	35.8
740823	0751	2	2.2	31.4	35.8
740823	0752	3	2.2	31.5	35.8
740823	0753	4	1.8	31.4	35.7
740823	0754	5	1.8	31.4	35.7
740823	0755	6	1.8	31.4	35.7
740823	0756	7	1.8	31.4	35.8
740823	0757	8	1.8	31.5	35.7
740823	0758	9	2.0	31.5	35.7
740823	0759	10	1.9	31.5	35.8
740823	0800	11	1.8	31.5	35.8
740823	0801	12	1.8	31.4	35.8
740823	0802	13	1.0	31.5	35.7
740823	0803	14	1.8	31.5	35.8
740823	0804	15	2.1	31.5	35.7
740823	0805	16	2.2	31.5	35.6
740823	0806	17	2.3	31.6	35.7
740823	0807	18	2.2	31.5	35.7

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-16-D 50' FROM DEAD END OF CANAL VII

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0808	19	2.4	31.5	35.7
740823	0809	20	2.4	31.5	35.7
740823	1020	1	2.8	31.3	35.6
740823	1021	2	2.8	31.4	35.6
740823	1022	3	2.6	31.3	35.6
740823	1023	4	2.8	31.4	35.5
740823	1024	5	2.8	31.4	35.5
740823	1025	6	2.6	31.4	35.5
740823	1026	7	2.6	31.4	35.5
740823	1027	8	2.6	31.4	35.5
740823	1028	9	2.5	31.3	35.5
740823	1029	10	2.4	31.4	35.5
740823	1030	11	2.4	31.4	35.5
740823	1031	12	2.4	31.4	35.5
740823	1032	13	2.4	31.4	35.5
740823	1033	14	2.4	31.4	35.5
740823	1034	15	2.5	31.4	35.5
740823	1035	16	2.5	31.4	35.5
740823	1036	17	2.5	31.4	35.5
740823	1037	18	2.4	31.4	35.5
740823	1038	19	2.5	31.3	35.6
740823	1320	1	3.2	31.7	35.4
740823	1321	2	3.1	31.7	35.4
740823	1322	3	2.9	31.6	35.4
740823	1323	4	2.7	31.6	35.4
740823	1324	5	2.4	31.5	35.5
740823	1325	6	2.2	31.5	35.5
740823	1326	7	2.1	31.5	35.4
740823	1327	8	2.0	31.5	35.5
740823	1328	9	7.4	31.5	35.5
740823	1329	10	1.7	31.5	35.5
740823	1330	11	1.6	31.5	35.5
740823	1331	12	1.6	31.5	35.5
740823	1332	13	1.6	31.4	35.5
740823	1333	14	1.6	31.5	35.5
740823	1334	15	1.6	31.4	35.5
740823	1335	16	1.6	31.5	35.5
740823	1336	17	1.6	31.5	35.5
740823	1337	18	1.6	31.4	35.5
740823	1338	19	1.6	31.5	35.5
740823	1653	1	2.2	31.7	35.4
740823	1654	2	2.3	31.7	35.4
740823	1655	3	2.1	31.7	35.4
740823	1656	4	2.2	31.7	35.4
740823	1657	5	2.1	31.7	35.4
740823	1658	6	2.0	31.6	35.4
740823	1659	7	1.8	31.6	35.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-16-D 50' FROM DEAD END OF CANAL VII

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	1700	8	1.6	31.6	35.4
740823	1701	9	1.3	31.6	35.4
740823	1702	10	1.2	31.7	35.4
740823	1703	11	1.0	31.6	35.4
740823	1704	12	1.0	31.6	35.4
740823	1705	13	1.1	31.5	35.4
740823	1706	14	1.1	31.5	35.4
740823	1707	15	1.1	31.5	35.4
740823	1708	16	0.8	31.5	35.5
740823	1709	17	0.7	31.3	35.6
740823	1710	18	0.7	31.3	35.6
740823	1829	1	1.9	31.5	35.5
740823	1830	2	1.8	31.5	35.5
740823	1831	3	1.8	31.5	35.5
740823	1832	4	1.8	31.5	35.5
740823	1833	5	1.8	31.5	35.5
740823	1834	6	1.8	31.5	35.5
740823	1835	7	1.8	31.5	35.4
740823	1836	8	1.8	31.5	35.5
740823	1837	9	1.7	31.5	35.5
740823	1838	10	1.7	31.5	35.5
740823	1839	11	1.7	31.5	35.5
740823	1840	12	1.8	31.5	35.4
740823	1841	13	1.8	31.5	35.4
740823	1842	14	1.8	31.5	35.4
740823	1843	15	1.8	31.5	35.4
740823	1844	16	1.5	31.5	35.4
740823	1845	17	1.6	31.5	35.4
740823	1846	18	1.7	31.4	35.4
740823	1847	19	1.5	31.4	35.4
740822					
NUMBER			171	171	171
MAXIMUM			7.4	32.0	36.0
MINIMUM			0.6	30.9	35.1
MEAN			2.3	31.6	35.5
740823					

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-17-D 400' FRM CLSED END OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740822	1954	1	5.5	30.6	35.9
740822	1955	2	5.5	30.8	36.0
740822	1956	3	5.5	30.7	36.1
740822	1957	4	5.5	30.7	36.1
740822	1958	5	5.5	30.7	35.9
740822	1959	6	5.4	30.9	36.0
740822	2000	7	5.0	31.6	35.5
740822	2001	8	4.5	31.8	35.3
740822	2002	9	4.4	32.0	35.2
740822	2003	10	4.3	32.0	35.2
740822	2004	11	4.3	32.0	35.1
740822	2005	12	4.3	32.0	35.1
740822	2006	13	4.2	32.0	35.1
740822	2007	14	4.1	32.1	35.3
740822	2008	15	4.1	32.1	35.1
740822	2009	16	4.0	31.9	35.2
740822	2010	17	4.0	32.0	35.4
740822	2011	18	3.7	31.8	35.2
740822	2012	19	3.6	31.9	35.5
740822	2013	20	3.6	31.9	35.4
740822	2014	21	3.6	31.8	35.3
740822	2015	22	3.6	31.8	35.4
740822	2016	23	3.4	31.7	35.4
740822	2024	18	3.2	31.7	35.3
740822	2025	19	3.3	31.7	35.5
740822	2026	20	3.4	31.7	35.5
740822	2027	21	3.5	31.7	35.5
740822	2207	1	5.6	30.1	36.3
740822	2208	2	5.6	30.1	36.3
740822	2209	3	5.6	30.1	36.3
740822	2210	4	5.6	30.4	36.3
740822	2211	5	5.5	30.4	36.3
740822	2212	6	4.9	30.7	36.3
740822	2213	7	4.6	31.3	35.4
740822	2214	8	4.6	31.4	35.6
740822	2215	9	4.3	31.4	35.6
740822	2216	10	4.1	31.8	35.6
740822	2217	11	4.1	32.1	35.1
740822	2218	12	4.0	32.1	35.1
740822	2219	13	4.0	32.1	35.1
740822	2220	14	3.8	32.1	35.1
740822	2221	15	3.7	32.1	35.3
740822	2222	16	3.7	31.9	35.3
740822	2223	17	3.6	31.9	35.3
740823	0030	1	5.4	30.3	36.3
740823	0031	2	5.4	30.4	36.2
740823	0032	3	5.3	30.5	36.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-17-D 400' FRM CLSED END OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0033	4	5.3	30.5	36.2
740823	0034	5	5.2	30.5	36.1
740823	0035	6	5.4	30.5	36.2
740823	0036	7	4.9	31.1	35.7
740823	0037	8	4.7	31.3	35.5
740823	0038	9	4.3	31.9	35.3
740823	0039	10	4.2	31.9	35.3
740823	0040	11	4.1	32.0	35.3
740823	0041	12	4.3	31.9	35.3
740823	0042	13	4.2	31.9	35.2
740823	0043	14	4.3	32.0	35.2
740823	0044	15	4.2	31.9	35.3
740823	0045	16	4.2	31.8	35.3
740823	0046	17	3.9	31.8	35.3
740823	0047	18	4.0	31.8	35.3
740823	0048	19	3.5	31.8	35.3
740823	0049	20	3.4	31.8	35.3
740823	0050	21	3.3	31.7	35.3
740823	0051	22	3.5	31.8	35.3
740823	0405	1	3.9	31.5	35.7
740823	0406	2	3.9	31.4	35.7
740823	0407	3	3.9	31.5	35.6
740823	0408	4	3.9	31.5	35.6
740823	0409	5	3.8	31.5	35.7
740823	0410	6	3.9	31.4	35.7
740823	0411	7	3.8	31.5	35.6
740823	0412	8	3.8	31.4	35.6
740823	0413	9	3.8	31.5	35.7
740823	0414	10	3.8	31.4	35.6
740823	0415	11	3.7	31.4	35.6
740823	0416	12	3.8	31.7	35.6
740823	0417	13	3.8	31.6	35.6
740823	0418	14	3.8	31.5	35.6
740823	0419	15	3.6	31.8	35.6
740823	0420	16	3.4	32.0	35.4
740823	0421	17	3.5	31.9	35.3
740823	0422	18	3.1	31.9	35.3
740823	0423	19	3.2	31.9	35.4
740823	0424	20	3.0	32.0	35.5
740823	0425	21	2.5	31.8	35.5
740823	0426	22	2.5	31.8	35.4
740823	0427	23	2.6	31.8	35.5
740823	0428	24	2.4	31.8	35.5
740823	0429	25	2.3	31.7	35.5
740823	0810	1	4.4	30.0	36.7
740823	0811	2	4.3	30.0	36.6
740823	0812	3	4.3	30.2	36.4

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-17-D 400' FRM CLSED END OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROHE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0813	4	4.3	30.5	36.3
740823	0814	5	4.3	30.6	36.3
740823	0815	6	4.2	30.7	36.2
740823	0816	7	4.2	30.7	36.2
740823	0817	8	4.2	30.9	36.2
740823	0818	9	4.2	30.9	36.2
740823	0819	10	4.2	30.9	36.2
740823	0820	11	4.2	30.9	36.1
740823	0821	12	.0	30.9	36.0
740823	0823	13	4.0	31.3	36.0
740823	0824	14	3.9	31.4	36.0
740823	0825	15	3.8	31.4	35.8
740823	0826	17	3.7	31.5	35.7
740823	0827	18	3.5	31.7	35.7
740823	0828	19	3.1	31.7	35.7
740823	0829	20	3.1	31.8	35.6
740823	0830	21	3.1	31.8	35.6
740823	0831	22	3.1	31.9	35.6
740823	0832	23	3.0	31.9	35.6
740823	0833	24	2.9	31.7	35.6
740823	1040	1	4.1	30.6	36.1
740823	1041	2	4.0	30.6	36.0
740823	1042	3	4.0	30.6	36.0
740823	1043	4	4.0	30.6	36.0
740823	1044	5	4.0	30.6	36.0
740823	1045	6	4.0	30.6	36.0
740823	1046	7	4.0	30.6	36.0
740823	1047	8	3.8	30.9	35.8
740823	1048	9	3.7	31.0	35.8
740823	1049	10	3.8	31.0	35.8
740823	1050	11	3.8	31.0	35.8
740823	1051	12	3.9	31.0	35.8
740823	1052	13	3.8	31.1	35.7
740823	1053	14	3.8	31.1	35.7
740823	1054	15	3.8	31.1	35.7
740823	1055	16	3.5	31.2	35.6
740823	1056	17	3.4	31.4	35.5
740823	1057	18	3.3	31.4	35.5
740823	1058	19	3.2	31.4	35.5
740823	1059	20	3.1	31.4	35.5
740823	1340	1	4.4	31.0	35.8
740823	1341	2	4.3	31.0	35.8
740823	1342	3	4.3	31.0	35.8
740823	1343	4	4.3	31.0	35.8
740823	1344	5	4.2	31.1	35.7
740823	1345	6	4.2	31.1	35.7
740823	1346	7	4.0	31.1	35.7

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-17-D 400' FRM CLSED END OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	1347	8	4.0	31.2	35.7
740823	1348	9	4.0	31.2	35.7
740823	1349	10	4.0	31.2	35.7
740823	1350	11	4.0	31.2	35.7
740823	1351	12	3.9	31.2	35.7
740823	1352	13	3.7	31.3	35.5
740823	1353	14	3.6	31.5	35.4
740823	1354	15	3.6	31.6	35.4
740823	1355	16	3.5	31.7	35.4
740823	1356	17	3.5	31.7	35.4
740823	1357	18	3.3	31.7	35.4
740823	1358	19	3.1	31.7	35.4
740823	1359	20	3.1	31.7	35.4
740823	1400	21	3.0	31.7	35.4
740823	1401	22	2.9	31.7	35.4
740823	1402	23	2.9	31.7	35.3
740823	1719	1	4.7	31.3	35.6
740823	1720	2	4.6	31.3	35.6
740823	1721	3	4.5	31.3	35.6
740823	1722	4	4.5	31.3	35.6
740823	1723	5	4.5	31.3	35.6
740823	1724	6	4.5	31.3	35.6
740823	1725	7	4.5	31.3	35.6
740823	1726	8	4.4	31.4	35.5
740823	1727	9	4.4	31.4	35.5
740823	1728	10	4.3	31.4	35.5
740823	1729	11	4.1	31.4	35.5
740823	1730	12	4.1	31.6	35.4
740823	1731	13	3.8	31.6	35.3
740823	1732	14	3.5	31.7	35.4
740823	1733	15	3.4	31.6	35.3
740823	1734	16	3.4	31.7	35.3
740823	1735	17	3.4	31.7	35.4
740823	1849	1	4.8	31.1	35.7
740823	1850	2	4.8	31.1	35.7
740823	1851	3	4.7	31.2	35.7
740823	1852	4	4.8	31.2	35.7
740823	1853	5	4.8	31.2	35.7
740823	1854	6	4.7	31.2	35.7
740823	1855	7	4.7	31.2	35.7
740823	1856	8	4.6	31.2	35.6
740823	1857	9	4.7	31.2	35.6
740823	1858	10	4.6	31.2	35.6
740823	1859	11	4.6	31.2	35.6
740823	1900	12	4.2	31.3	35.5
740823	1901	13	3.8	31.5	35.4
740823	1902	14	3.7	31.6	35.4

APPENDIX B-2.3

```
        ENVIRONMENTAL PROTECTION AGENCY  REGION IV
   SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
          FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - SA-17-D          400' FRM CLSED END OF BORROW PIT
-------------------------------------------------------------
                     00003      00299      00010      00480
                     DEPTH       DO        WATER    SALINITY
                                PROBE      TEMP
DATE   TIME          FEET       MG/L       CENT       PPTH

740823 1903           15         3.5       31.6       35.4
740823 1904           16         2.8       31.6       35.4
740823 1905           17         2.9       31.6       35.4
740823 1906           18         3.3       31.6       35.4
740823 1907           19         3.3       31.6       35.4
740823 1908           20         2.8       31.6       35.4
740823 1909           21         2.1       31.6       35.4
740823 1910           22         1.3       31.4       35.5

740822
   NUMBER                        196        196        196
   MAXIMUM                       5.6       32.1       36.7
   MINIMUM                       1.3       30.0       35.1
   MEAN                          4.0       31.4       35.6
740823
```

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-18-D AT MOUTH OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740822	2018	1	6.3	30.2	36.4
740822	2019	2	6.3	30.3	36.3
740822	2020	3	6.2	30.2	36.6
740822	2021	4	6.2	30.2	36.4
740822	2022	5	6.0	30.4	36.1
740822	2023	6	5.3	30.2	36.3
740822	2024	7	5.0	30.6	36.2
740822	2025	8	4.8	31.2	35.9
740822	2026	9	4.8	31.2	35.8
740822	2229	1	5.4	30.3	36.3
740822	2230	2	5.4	30.3	36.3
740822	2231	3	5.3	30.3	36.3
740822	2232	4	5.3	30.4	36.3
740822	2233	5	5.2	30.4	36.3
740822	2234	6	5.2	30.6	36.3
740822	2235	7	5.2	30.6	36.2
740822	2236	8	5.2	30.6	36.2
740822	2237	9	5.0	30.6	36.2
740822	2238	10	4.7	31.2	35.7
740822	2239	11	4.7	31.2	35.7
740823	0053	1	5.5	30.5	36.2
740823	0054	2	5.4	30.5	36.2
740823	0055	3	5.5	30.4	36.2
740823	0056	4	5.4	30.4	35.9
740823	0057	5	5.3	30.6	36.2
740823	0058	6	5.0	30.5	35.9
740823	0059	7	4.9	31.1	35.7
740823	0100	8	4.4	31.0	35.6
740823	0101	9	4.4	31.4	35.6
740823	0430	1	4.5	30.6	36.2
740823	0431	2	4.5	30.6	36.2
740823	0432	3	4.2	30.7	36.3
740823	0433	4	4.4	30.7	36.1
740823	0434	5	4.1	30.9	36.1
740823	0435	6	3.8	30.9	36.1
740823	0436	7	3.6	31.2	35.9
740823	0437	8	3.3	31.1	35.9
740823	0438	9	3.0	31.3	35.8
740823	0439	10	2.7	31.4	35.8
740823	0440	11	2.4	31.5	35.7
740823	0441	12	2.6	31.4	35.6
740823	0834	1	4.5	29.1	37.0
740823	0835	2	4.4	29.2	37.1
740823	0836	3	4.3	29.2	37.0
740823	0837	4	4.3	29.2	37.0
740823	0838	5	4.3	29.3	37.0
740823	0839	6	4.3	29.3	37.0

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-18-D AT MOUTH OF BORROW PIT

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740823	0840	7	4.3	29.3	37.0
740823	0841	8	4.2	29.4	37.0
740823	0842	9	4.1	29.4	37.0
740823	0843	10	4.0	29.6	36.8
740823	0844	11	4.0	29.8	36.8
740823	1101	1	4.4	29.8	36.5
740823	1102	2	4.4	29.8	36.5
740823	1103	3	4.3	29.8	36.5
740823	1104	4	4.2	29.8	36.6
740823	1105	5	4.0	29.7	36.7
740823	1106	6	3.7	29.6	36.8
740823	1107	7	3.5	29.3	37.0
740823	1108	8	3.5	29.0	37.1
740823	1109	9	3.5	28.9	37.2
740823	1110	10	3.5	28.9	37.2
740823	1111	11	3.6	28.8	37.2
740823	1112	12	3.6	28.8	37.2
740823	1113	13	3.6	28.8	37.2
740823	1420	1	4.2	30.9	35.9
740823	1421	2	4.2	30.9	35.9
740823	1422	3	4.3	30.9	35.9
740823	1423	4	4.3	30.9	35.9
740823	1424	5	4.2	30.9	35.9
740823	1425	6	4.3	30.9	35.9
740823	1426	7	4.4	30.9	35.9
740823	1427	8	4.6	31.0	35.8
740823	1428	9	4.6	30.9	35.8
740823	1429	10	4.5	31.0	35.8
740823	1430	11	4.3	31.0	35.8
740823	1431	12	4.2	31.0	35.8
740823	1737	1	4.5	31.1	35.7
740823	1738	2	4.4	31.2	35.7
740823	1739	3	4.3	31.2	35.7
740823	1740	4	4.3	31.2	35.7
740823	1741	5	4.3	31.1	35.7
740823	1742	6	4.3	31.1	35.6
740823	1743	7	4.2	31.2	35.6
740823	1744	8	4.3	31.2	35.6
740823	1745	9	4.3	31.2	35.6
740823	1746	10	4.2	31.2	35.6
740823	1747	11	3.5	31.2	35.6
740823	1748	12	3.2	31.3	35.6
740823	1749	13	2.8	31.3	35.5
740823	1912	1	5.4	31.0	35.8
740823	1913	2	5.3	31.1	35.8
740823	1914	3	5.3	31.1	35.8
740823	1915	4	5.3	31.1	35.7

APPENDIX B-2.3

```
        ENVIRONMENTAL PROTECTION AGENCY  REGION IV
    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
         FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - SA-18-D             AT MOUTH OF BORROW PIT
------------------------------------------------------------
                       00003      00299      00010      00480
                       DEPTH        DO       WATER    SALINITY
                                  PROBE       TEMP
DATE    TIME            FEET       MG/L       CENT       PPTH

740823 1916               5        5.3        31.0       35.7
740823 1917               6        5.3        31.1       35.7
740823 1918               7        5.3        31.0       35.7
740823 1919               8        5.3        31.0       35.7
740823 1920               9        5.2        31.0       35.7
740823 1921              10        5.2        31.0       35.7
740823 1922              11        5.2        31.1       35.7
740823 1923              12        5.1        31.1       35.7
740823 1924              13        5.0        31.1       35.7

740822
    NUMBER                          103        103        103
    MAXIMUM                         6.3       31.5       37.2
    MINIMUM                         2.4       28.8       35.5
    MEAN                            4.5       30.5       36.1
740823
```

APPENDIX B-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-19-D BCKGRND 600'SEAWRD FRM PROJ SITE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740822	2028	1	5.8	30.1	36.8
740822	2029	2	5.8	30.0	36.8
740822	2030	3	5.7	30.0	36.8
740822	2031	4	5.7	29.9	36.8
740822	2032	5	5.7	29.9	36.8
740822	2033	6	5.7	29.9	36.8
740822	2241	1	5.3	30.0	36.8
740822	2242	2	5.3	30.0	36.8
740822	2243	3	5.4	30.0	36.8
740822	2244	4	5.3	30.0	36.8
740822	2245	5	5.3	30.0	36.8
740822	2246	6	5.3	30.0	36.8
740823	0103	1	5.2	29.1	37.0
740823	0104	2	5.0	29.1	37.0
740823	0105	3	5.2	29.2	37.1
740823	0106	4	5.0	29.1	37.0
740823	0107	5	5.0	29.2	37.0
740823	0443	1	4.5	29.6	36.8
740823	0444	2	4.5	29.8	36.8
740823	0445	3	4.4	29.7	36.8
740823	0446	4	4.2	29.6	36.8
740823	0447	5	4.4	29.7	36.7
740823	0448	6	4.1	29.7	36.8
740823	0449	7	4.0	29.6	36.8
740823	0845	1	4.8	29.3	37.0
740823	0846	2	4.6	29.4	37.0
740823	0847	3	4.6	29.3	37.1
740823	0848	4	4.6	29.3	37.1
740823	0849	5	4.0	28.9	37.2
740823	0850	6	3.8	28.9	37.4
740823	0851	7	3.7	28.8	37.4
740823	1115	1	5.6	29.0	37.1
740823	1116	2	5.5	29.0	37.0
740823	1117	3	5.5	29.0	37.1
740823	1118	4	5.5	29.0	37.1
740823	1401	2	6.3	29.8	36.6
740823	1449	1	6.3	29.9	36.5
740823	1442	3		29.8	36.5
740823	1751	1	7.1	30.0	36.4
740823	1752	2	7.1	30.0	36.4
740823	1753	3	7.1	30.0	36.5
740823	1926	1	7.9	29.9	36.5
740823	1927	2	7.9	29.9	36.5
740823	1928	3	8.0	29.9	36.5
740823	1929	4	8.0	29.9	36.5
740822					
NUMBER			44	45	45
MAXIMUM			8.0	30.1	37.4
MINIMUM			3.7	28.8	36.4
MEAN			5.4	29.6	36.8
740823					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-01-D ATLANTIC BCH-NEAR CANAL DEAD END

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1845	1	10.4	26.8	30.1
740917	1846	2	7.6	26.8	30.1
740917	1847	3	7.0	26.8	31.7
740917	1848	4	6.8	26.8	31.9
740917	1849	5	5.0	26.8	33.1
740917	1850	6	3.7	26.8	33.1
740917	1851	7	2.9	27.1	33.7
740917	1852	8	2.3	27.1	33.7
740917	1853	9	1.2	27.0	34.3
740917	1854	10	0.9	27.2	34.3
740917	1855	11	0.5	27.2	34.3
740917	2100	1	9.2	26.0	28.2
740917	2101	2	8.1	26.2	31.2
740917	2102	3	8.0	26.8	31.2
740917	2103	4	7.0	26.8	32.4
740917	2104	5	5.6	27.0	32.4
740917	2105	6	4.4	27.0	33.0
740917	2106	7	3.5	27.0	33.0
740917	2107	8	2.9	27.0	34.0
740917	2108	9	2.1	27.2	34.0
740917	2109	10	1.5	27.2	34.3
740917	2110	11	1.0	27.2	34.3
740917	2111	12	0.8	27.2	34.6
740917	2112	13	0.4	27.2	34.6
740917	2335	1	9.0	25.5	29.2
740917	2336	2	8.3	26.6	31.4
740917	2337	3	7.9	26.5	32.2
740917	2338	4	6.5	26.7	32.4
740917	2339	5	5.4	26.8	33.2
740917	2340	6	5.2	26.8	33.6
740917	2341	7	3.6	26.7	33.6
740917	2342	8	2.8	26.8	34.0
740917	2343	9	2.2	27.0	34.0
740917	2344	10	1.6	27.1	34.2
740917	2345	11	0.9	27.1	34.5
740917	2346	12	0.5	27.0	34.4
740917	2347	13	0.1	27.2	34.5
740917	2348	14	0.0	27.0	34.6
740917	2349	15	0.0	27.0	34.6
740918	0255	1	7.4	25.7	30.2
740918	0256	2	7.2	26.5	32.6
740918	0257	3	4.9	26.8	33.0
740918	0258	4	4.3	26.9	33.0
740918	0259	5	3.4	26.9	33.7
740918	0300	6	2.8	26.7	33.7
740918	0301	7	2.4	26.9	33.8
740918	0302	8	1.7	26.9	34.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-01-D ATLANTIC BCH-NEAR CANAL DEAD END

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740918	0303	9	0.9	26.9	34.2
740918	0304	10	0.3	27.0	34.2
740918	0305	11	0.0	27.0	34.4
740918	0306	12	0.0	27.0	34.4
740918	0307	13	0.0	26.9	34.6
740918	0610	1	7.5	23.0	27.9
740918	0611	2	5.3	25.2	30.2
740918	0612	3	5.0	26.6	33.3
740918	0613	4	4.8	26.6	33.3
740918	0614	5	3.7	26.5	33.6
740918	0615	6	2.4	26.8	33.7
740918	0616	7	1.6	26.9	34.0
740918	0617	8	1.2	26.9	34.1
740918	0618	9	0.7	27.2	34.4
740918	0619	10	0.6	26.9	34.4
740918	0620	11	0.6	26.9	34.5
740918	0621	12	0.0	26.9	34.6
740918	0915	1	6.4	24.3	29.6
740918	0916	2	5.9	24.3	29.7
740918	0917	3	4.6	25.5	31.9
740918	0918	4	3.8	25.9	32.5
740918	0919	5	3.3	26.6	33.3
740918	0920	6	2.6	26.4	33.3
740918	0931	7	2.0	26.6	33.9
740918	0932	8	1.6	26.7	33.9
740918	0933	9	1.2	26.9	33.9
740918	0934	10	1.0	26.7	33.9
740918	0935	11	0.8	26.9	34.0
740918	0936	12	0.3	27.0	34.1
740918	0937	13	0.2	27.0	34.5
740918	0938	14	0.2	26.8	34.4
740918	1355	1	8.5	26.1	29.1
740918	1356	2	6.8	27.0	32.2
740918	1357	3	6.0	26.9	33.2
740918	1358	4	5.6	26.9	33.1
740918	1359	5	4.1	26.6	33.1
740918	1400	6	3.0	26.4	33.3
740918	1401	7	2.5	26.6	33.4
740918	1402	8	1.7	26.7	33.6
740918	1403	9	1.2	27.2	33.7
740918	1404	10	0.4	27.1	34.0
740918	1405	11	0.0	27.2	34.1
740918	1406	12	0.0	27.1	34.2
740918	1407	13	0.0	27.1	34.4
740918	1515	1	9.7	26.7	30.4
740918	1516	2	9.4	27.1	32.7
740918	1517	3	9.0	26.7	32.0

APPENDIX B-2.4

```
          ENVIRONMENTAL PROTECTION AGENCY  REGION IV
      SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
           FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - AB-01-D          ATLANTIC BCH-NEAR CANAL DEAD END
-----------------------------------------------------------------
                         00003      00299      00010      00480
                         DEPTH       DO        WATER    SALINITY
                                    PROBE      TEMP
DATE   TIME               FEET      MG/L       CENT       PPTH

740918 1518                4         4.6       26.5       33.0
740918 1519                5         4.0       26.3       32.9
740918 1520                6         3.5       26.0       33.0
740918 1521                7         2.6       26.5       33.2
740918 1522                8         1.7       26.7       33.3
740918 1523                9         0.9       27.1       33.9
740918 1524               10         0.3       27.0       34.1
740918 1525               11         0.2       26.9       34.1
740918 1526               12         0.1       26.9       34.1
740918 1527               13         0.1       26.9       34.3
740918 1835                1        10.6       27.1       31.9
740918 1836                2         9.0       27.1       31.6
740918 1837                3         8.5       26.9       32.5
740918 1838                4         5.0       26.8       32.5
740918 1839                5         3.8       26.7       32.5
740918 1840                6         2.8       26.5       32.8
740918 1841                7         1.3       27.0       33.3
740918 1842                8         0.9       27.0       33.5
740918 1843                9         0.6       27.1       33.6
740918 1844               10         0.2       27.2       33.7
740918 1845               11         0.1       27.1       33.9
740918 1846               12         0.1       27.0       33.9

740917
   NUMBER                           116        116        116
   MAXIMUM                         10.6       27.2       34.6
   MINIMUM                          0.0       23.0       27.9
   MEAN                             3.3       26.7       33.1
740918
```

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-02-D ATLANTIC BCH-W OF MOREHEAD AVE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1830	1	6.7	26.8	30.8
740917	1831	2	7.1	26.8	30.8
740917	1832	3	7.5	26.8	31.3
740917	1833	4	6.0	26.9	31.3
740917	1834	5	5.6	26.9	32.8
740917	1835	6	3.3	26.8	32.8
740917	1836	7	2.9	26.8	33.3
740917	1837	8	2.1	26.8	33.3
740917	1838	9	1.9	26.8	34.1
740917	1839	10	1.6	26.9	34.1
740917	1840	11	1.2	26.9	34.1
740917	2040	1	6.8	26.1	30.7
740917	2041	2	7.1	26.3	30.7
740917	2042	3	7.0	26.5	32.5
740917	2043	4	5.8	26.5	32.5
740917	2044	5	5.2	26.5	32.9
740917	2045	6	4.8	26.5	32.9
740917	2046	7	4.2	26.5	33.5
740917	2047	8	3.2	26.7	33.5
740917	2048	9	3.1	26.7	33.5
740917	2049	10	1.9	27.0	33.5
740917	2400	1	7.5	26.1	31.0
740918	0001	2	7.2	26.2	31.2
740918	0002	3	6.6	26.3	31.7
740918	0003	4	5.3	26.3	32.9
740918	0004	5	5.5	26.3	33.1
740918	0005	6	5.4	26.0	33.1
740918	0006	7	4.5	26.4	33.3
740918	0007	8	2.7	26.5	33.7
740918	0008	9	2.1	26.8	33.8
740918	0009	10	1.9	26.7	33.8
740918	0010	11	1.7	26.7	33.8
740918	0310	1	6.3	25.6	30.7
740918	0311	2	5.0	26.5	32.6
740918	0312	3	4.8	26.4	33.1
740918	0313	4	4.2	26.5	33.4
740918	0314	5	3.8	26.7	33.8
740918	0315	6	2.3	26.7	33.8
740918	0316	7	1.0	26.8	34.0
740918	0317	8	0.1	26.8	34.3
740918	0622	1	6.6	25.4	31.7
740918	0623	2	5.8	25.3	31.4
740918	0624	3	5.2	26.0	33.1
740918	0625	4	4.2	26.1	33.4
740918	0626	5	3.8	26.1	33.4
740918	0627	6	3.1	26.2	33.6
740918	0628	7	2.4	26.4	33.9

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-02-D ATLANTIC BCH-W OF MOREHEAD AVE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740918	0629	8	1.8	26.5	33.9
740918	0630	9	1.1	26.5	34.1
740918	0631	10	0.7	26.6	34.3
740918	0935	1	4.7	25.0	31.3
740918	0936	2	4.6	25.7	31.7
740918	0937	3	4.2	25.7	31.8
740918	0938	4	4.0	25.5	32.3
740918	0939	5	3.8	25.5	32.4
740918	0940	6	3.4	25.7	32.7
740918	0941	7	2.9	25.5	32.8
740918	0942	8	2.4	25.6	33.2
740918	0943	9	2.1	25.7	33.3
740918	0944	10	1.9	25.8	33.2
740918	0945	11	1.9	25.7	33.4
740918	1340	1	8.1	26.9	31.6
740918	1341	2	7.3	26.7	32.0
740918	1342	3	6.2	26.3	32.3
740918	1343	4	5.4	26.0	32.6
740918	1344	5	5.5	25.6	32.5
740918	1345	6	4.5	25.4	32.8
740918	1346	7	3.2	25.5	32.9
740918	1347	8	2.5	25.9	32.2
740918	1348	9	1.6	26.7	33.7
740918	1349	10	0.6	26.8	33.8
740918	1350	11	0.3	26.8	33.8
740918	1530	1	9.9	27.1	31.6
740918	1531	2	9.6	26.6	32.4
740918	1532	3	8.3	26.5	32.5
740918	1533	4	7.0	26.1	32.5
740918	1534	5	5.8	25.7	32.4
740918	1535	6	4.8	25.3	32.6
740918	1536	7	2.4	25.6	33.0
740918	1537	8	1.4	26.1	33.4
740918	1538	9	0.9	26.4	33.7
740918	1539	10	0.6	26.5	33.4
740918	1540	11	0.2	26.6	33.7
740918	1750	1	11.7	27.0	31.8
740918	1751	2	9.6	27.1	31.6
740918	1752	3	8.7	26.5	32.4
740918	1753	4	7.0	26.3	32.7
740918	1754	5	4.8	26.0	32.4
740918	1755	6	2.7	25.9	32.6
740918	1756	7	1.8	26.1	32.9
740918	1757	8	1.1	26.3	33.2
740918	1758	9	0.6	26.5	33.3
740918	1759	10	0.2	26.6	33.5
740918	1800	11	0.2	26.8	32.0
740917					
NUMBER			94	94	94
MAXIMUM			11.7	27.1	34.3
MINIMUM			0.1	25.0	30.7
MEAN			4.1	26.3	32.8
740918					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-03-D ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1820	1	5.2	26.1	31.4
740917	1821	2	4.6	26.3	31.4
740917	1822	3	4.5	26.3	32.7
740917	1823	4	4.4	26.3	32.7
740917	1824	5	4.3	26.3	32.8
740917	1825	6	3.8	26.3	32.8
740917	1826	7	3.6	26.3	33.4
740917	2030	1	5.8	26.2	32.1
740917	2031	2	5.8	26.2	32.1
740917	2032	3	5.8	26.2	33.0
740917	2033	4	5.7	26.2	33.0
740917	2034	5	5.7	26.2	33.0
740917	2035	6	5.5	26.2	33.0
740917	2036	7	5.4	26.2	33.1
740918	0015	1	6.6	25.8	31.6
740918	0016	2	6.4	26.3	32.2
740918	0017	3	5.8	26.3	32.7
740918	0018	4	5.8	26.3	32.9
740918	0019	5	5.7	26.2	33.0
740918	0020	6	4.6	26.2	33.2
740918	0021	7	3.7	26.5	33.7
740918	0320	1	7.1	26.1	31.8
740918	0321	2	6.0	26.3	32.1
740918	0322	3	5.6	26.3	32.9
740918	0323	4	5.3	26.3	33.0
740918	0324	5	4.5	26.3	33.3
740918	0325	6	2.6	26.3	33.1
740918	0326	7	1.9	26.5	33.5
740918	0635	1	5.1	25.3	32.5
740918	0636	2	4.9	25.3	32.5
740918	0637	3	4.8	25.3	33.0
740918	0638	4	4.7	25.2	33.0
740918	0639	5	4.7	25.2	33.0
740918	0640	6	4.6	25.2	33.0
740918	0955	1	4.2	24.7	32.0
740918	0956	2	4.2	24.7	31.9
740918	0957	3	4.2	24.7	32.0
740918	0958	4	4.0	24.8	32.0
740918	0959	5	4.0	24.7	32.7
740918	1000	6	4.0	24.6	32.7
740918	1001	7	4.0	24.6	32.6
740918	1002	8	3.9	24.6	32.7
740918	1330	1	7.0	26.7	32.1
740918	1331	2	6.9	26.7	32.1
740918	1332	3	6.6	26.0	32.3
740918	1333	4	6.4	25.6	32.4
740918	1334	5	6.0	25.6	32.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-03-D ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740918	1335	6	4.9	25.3	32.6
740918	1336	7	5.3	25.0	32.8
740918	1540	1	8.4	27.8	31.7
740918	1541	2	8.5	27.5	31.9
740918	1542	3	8.1	27.5	31.9
740918	1543	4	6.9	26.4	32.1
740918	1544	5	5.6	25.2	32.5
740918	1545	6	4.5	25.0	32.5
740918	1805	1	9.0	27.3	31.0
740918	1806	2	8.4	26.8	31.7
740918	1807	3	8.2	26.7	32.2
740918	1808	4	7.2	26.5	32.2
740918	1809	5	6.8	25.9	32.5
740918	1810	6	6.3	25.6	32.5
740917					
NUMBER			61	61	61
MAXIMUM			9.0	27.8	33.7
MINIMUM			1.9	24.6	31.0
MEAN			5.5	26.0	32.5
740918					

APPENDIX B-2.4

, ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-04-0 ATLANTIC BCH-HR CANAL DEAD END

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1730	1	8.4	26.9	28.6
740917	1731	2	7.6	26.9	31.7
740917	1732	3	6.7	26.9	33.1
740917	1733	4	6.2	26.9	33.3
740917	1734	5	5.0	26.9	33.3
740917	1735	6	4.6	26.9	33.6
740917	1736	7	4.1	26.7	33.6
740917	1737	8	3.6	26.7	34.1
740917	1738	9	1.8	26.7	34.1
740917	1739	10	1.2	26.7	34.4
740917	1740	11	0.2	26.9	34.4
740917	1940	1	7.4	27.0	29.4
740917	1941	2	6.4	27.0	29.4
740917	1942	3	6.1	27.0	32.2
740917	1943	4	5.7	27.1	32.2
740917	1944	5	5.5	27.1	33.4
740917	1945	6	4.6	27.1	33.4
740917	1946	7	4.0	27.1	33.7
740917	1947	8	3.8	27.0	33.7
740917	1948	9	4.2	27.0	33.7
740917	1949	10	3.2	26.8	33.7
740917	1950	11	1.8	26.8	34.1
740917	1951	12	1.6	26.9	34.1
740918	0030	1	7.3	26.1	27.9
740918	0031	2	6.6	26.7	32.4
740918	0032	3	5.7	26.6	32.5
740918	0033	4	5.6	26.7	33.1
740918	0034	5	5.5	26.5	32.9
740918	0035	6	5.5	26.5	33.2
740918	0036	7	5.6	26.7	33.3
740918	0037	8	5.1	27.0	33.4
740918	0038	9	4.1	27.0	33.6
740918	0039	10	3.2	26.9	33.7
740918	0040	11	1.9	27.1	34.2
740918	0335	1	7.0	23.1	25.2
740918	0336	2	6.1	26.4	31.0
740918	0337	3	5.4	26.6	32.7
740918	0338	4	5.4	26.7	33.0
740918	0339	5	5.7	27.0	33.4
740918	0340	6	5.1	27.0	33.5
740918	0341	7	4.3	26.9	33.6
740918	0342	8	3.1	27.0	33.7
740918	0343	9	1.7	26.9	34.2
740918	0344	10	0.0	26.9	34.5
740918	0710	1	5.9	25.1	29.4
740918	0711	2	5.6	25.7	30.4
740918	0712	3	5.4	26.3	31.6

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-04-0 ATLANTIC BCH-HR CANAL DEAD END

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740918	0713	4	5.3	26.5	32.6
740918	0714	5	5.1	26.5	33.0
740918	0715	6	5.0	26.5	33.4
740918	0716	7	5.0	26.6	33.4
740918	0717	8	4.6	26.6	33.4
740918	0718	9	3.7	26.7	33.6
740918	0719	10	2.8	26.7	33.8
740918	0720	11	1.8	26.7	33.9
740918	1010	1	4.4	26.5	32.9
740918	1011	2	4.1	26.6	33.1
740918	1012	3	4.0	26.6	33.1
740918	1013	4	4.0	26.6	33.2
740918	1014	5	3.9	26.4	33.2
740918	1015	6	3.8	26.3	33.2
740918	1016	7	3.6	26.3	33.2
740918	1017	8	3.1	26.6	33.2
740918	1018	9	1.6	26.5	33.4
740918	1019	10	1.5	26.5	33.8
740918	1020	11	1.2	26.5	33.8
740918	1021	12	0.5	26.6	33.4
740918	1022	13	0.0	26.6	34.2
740918	1240	1	6.0	27.4	31.3
740918	1241	2	5.4	27.5	33.1
740918	1242	3	5.2	27.5	33.1
740918	1243	4	4.4	26.9	33.3
740918	1244	5	4.3	26.2	33.0
740918	1245	6	4.3	26.1	33.0
740918	1246	7	4.3	26.1	33.0
740918	1247	8	4.0	26.3	33.3
740918	1248	9	3.0	26.4	33.4
740918	1249	10	2.1	26.9	33.4
740918	1250	11	1.5	26.9	33.8
740918	1550	1	7.8	28.1	31.0
740918	1551	2	7.2	27.5	31.1
740918	1552	3	7.1	27.1	32.6
740918	1553	4	5.8	26.6	32.6
740918	1554	5	5.0	26.6	33.1
740918	1555	6	4.4	26.5	33.1
740918	1556	7	3.5	26.3	33.0
740918	1557	8	2.2	26.6	33.5
740918	1558	9	1.4	26.8	33.5
740918	1559	10	0.2	27.0	33.8
740918	1810	1	8.7	27.7	29.9
740918	1811	2	8.3	27.9	30.2
740918	1812	3	6.7	27.5	32.1
740918	1813	4	5.8	26.9	32.7
740918	1814	5	4.7	26.6	32.8
740918	1815	6	4.1	26.4	32.8
740918	1816	7	3.4	26.4	32.9
740918	1817	8	2.6	26.4	33.1
740918	1818	9	2.2	26.6	33.3
740917					
NUMBER			98	98	98
MAXIMUM			8.7	28.1	34.5
MINIMUM			0.0	23.1	25.2
MEAN			4.3	26.[illegible]	32.8
740918					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-05-D ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1750	1	7.4	26.7	30.1
740917	1751	2	6.6	26.8	31.6
740917	1752	3	5.9	26.8	32.7
740917	1753	4	5.8	26.8	33.2
740917	1754	5	5.3	26.8	33.2
740917	1755	6	5.0	26.2	33.2
740917	1756	7	4.7	26.2	33.3
740917	1757	8	4.2	26.2	33.3
740917	1758	9	3.9	26.2	33.6
740917	1955	1	6.3	26.5	31.0
740917	1956	2	6.1	26.5	31.8
740917	1957	3	5.9	26.5	31.8
740917	1958	4	5.5	26.5	32.1
740917	1959	5	5.2	26.5	32.1
740917	2000	6	5.2	26.5	32.6
740917	2001	7	5.2	26.5	32.6
740917	2002	8	4.9	26.5	33.3
740917	2003	9	4.0	26.5	33.3
740917	2004	10	3.6	26.5	33.5
740918	0045	1	6.5	24.9	27.8
740918	0046	2	6.2	26.2	31.2
740918	0047	3	5.8	26.4	32.1
740918	0048	4	5.5	26.3	32.2
740918	0049	5	5.4	26.4	32.9
740918	0050	6	5.3	26.3	33.1
740918	0051	7	5.1	26.3	33.3
740918	0052	8	5.0	26.3	33.3
740918	0053	9	4.6	26.4	33.6
740918	0054	10	3.9	26.3	33.8
740918	0345	1	6.2	25.0	29.2
740918	0346	2	6.0	26.2	32.0
740918	0347	3	5.7	26.6	32.5
740918	0348	4	5.5	26.6	32.8
740918	0349	5	5.3	26.5	33.1
740918	0350	6	5.2	26.4	33.1
740918	0351	7	4.9	26.4	33.3
740918	0352	8	4.3	26.4	33.8
740918	0353	9	2.7	26.4	33.7
740918	0354	10	1.5	26.6	34.0
740918	0730	1	5.6	24.1	28.9
740918	0731	2	5.2	25.5	31.5
740918	0732	3	5.2	26.1	32.5
740918	0733	4	5.1	26.3	33.0
740918	0734	5	5.0	26.3	33.0
740918	0735	6	5.0	26.3	33.3
740918	0736	7	4.6	26.3	33.3
740918	0737	8	4.0	26.3	33.3
740918	0738	9	4.0	26.3	33.3
740918	0739	10	2.3	26.3	33.3
740918	1025	1	4.6	25.0	29.6
740918	1026	2	4.5	25.8	30.8
740918	1027	3	4.4	26.0	32.7
740918	1028	4	3.9	25.7	32.7
740918	1029	5	3.8	25.1	32.6
740918	1030	6	3.8	24.9	32.6

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-05-D ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740918	1031	7	3.8	24.8	32.7
740918	1032	8	3.8	24.9	32.8
740918	1033	9	3.4	25.0	32.8
740918	1034	10	3.4	25.0	32.8
740918	1253	1	6.5	26.6	29.4
740918	1254	2	6.0	26.6	30.8
740918	1255	3	5.4	26.7	32.1
740918	1256	4	5.6	27.0	32.8
740918	1257	5	5.2	26.8	33.0
740918	1258	6	4.9	26.1	32.9
740918	1259	7	5.0	25.3	32.7
740918	1300	8	3.8	25.4	32.9
740918	1301	9	3.2	25.7	33.1
740918	1600	1	8.4	27.7	29.3
740918	1601	2	7.6	27.1	30.3
740918	1602	3	6.9	26.8	32.0
740918	1603	4	5.7	26.8	32.1
740918	1604	5	5.1	26.1	32.2
740918	1605	6	4.9	25.5	32.5
740918	1606	7	4.6	25.4	32.6
740918	1607	8	4.3	25.3	32.8
740918	1820	1	8.7	27.5	30.7
740918	1821	2	7.8	27.2	31.2
740918	1822	3	7.2	26.6	32.0
740918	1823	4	6.9	26.6	32.0
740918	1824	5	5.6	26.3	32.2
740918	1825	6	5.3	26.1	32.5
740918	1826	7	4.5	25.8	32.8
740918	1827	8	3.9	25.6	32.9
740917					
NUMBER		84	84	84	84
MAXIMUM		10	8.7	27.7	34.0
MINIMUM		1	1.5	24.1	27.8
MEAN		5	5.1	26.2	32.3
740918					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-06-D ATLANTIC BCH-W OF MOREHEAD AVE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1810	1	5.5	26.1	32.9
740917	1811	2	5.5	26.1	32.9
740917	1812	3	5.5	26.1	32.9
740917	1813	4	5.5	26.3	32.9
740917	1814	5	5.5	26.3	32.9
740917	1815	6	5.5	26.3	32.9
740917	2020	1	5.9	26.2	33.4
740917	2021	2	5.8	26.2	33.4
740917	2022	3	5.8	26.2	33.4
740917	2023	4	5.8	26.2	33.4
740917	2024	5	5.8	26.3	33.4
740918	0100	1	5.1	25.5	33.3
740918	0101	2	5.1	25.6	33.2
740918	0102	3	5.1	25.6	33.2
740918	0103	4	5.1	25.5	33.4
740918	0104	5	5.1	25.5	33.5
740918	0400	1	5.2	25.0	32.0
740918	0401	2	5.1	25.0	32.8
740918	0402	3	5.0	25.1	32.7
740918	0403	4	5.1	25.1	32.8
740918	0750	1	5.4	24.6	33.0
740918	0751	2	5.3	24.8	33.0
740918	0752	3	5.2	24.8	33.0
740918	0753	4	5.2	24.8	33.0
740918	0754	5	5.2	24.8	33.0
740918	1100	1	5.1	25.3	34.0
740918	1101	2	5.2	25.4	34.0
740918	1102	3	5.1	25.3	34.0
740918	1103	4	5.2	25.3	34.0
740918	1104	5	5.2	25.3	34.0
740918	1105	6	5.1	25.3	34.0
740918	1315	1	6.4	26.3	33.9
740918	1316	2	6.3	26.3	34.0
740918	1317	3	6.1	26.3	33.7
740918	1318	4	6.1	26.2	33.7
740918	1319	5	6.1	26.2	33.7
740918	1620	1	7.3	27.0	32.5
740918	1621	2	7.2	27.0	32.6
740918	1622	3	7.2	26.8	32.5
740918	1623	4	7.2	26.9	32.6
740918	1840	1	7.6	27.2	32.4
740918	1841	2	7.3	27.2	32.5
740918	1842	3	7.2	27.0	32.5
740918	1843	4	7.2	27.0	32.3
740918	1844	5	7.2	27.0	32.3
740917					
NUMBER			45	45	45
MAXIMUM			7.6	27.2	34.0
MINIMUM			5.0	24.6	32.0
MEAN			5.8	25.9	33.1
740918					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-07-D ATLANTIC BCH-W OF MOREHEAD AVE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740917	1801	1	6.1	26.3	32.9
740917	1802	2	6.1	26.3	32.9
740917	1803	3	6.1	26.3	32.9
740917	1804	4	6.1	26.3	33.1
740917	2010	1	6.3	26.4	34.1
740917	2011	2	6.3	26.4	34.1
740917	2012	3	6.3	26.4	34.1
740917	2013	4	6.2	26.4	34.1
740918	0115	1	6.0	26.3	36.5
740918	0116	2	6.0	26.2	36.5
740918	0117	3	6.0	26.4	36.3
740918	0118	4	6.0	26.3	36.3
740918	0415	1	5.8	25.4	33.6
740918	0416	2	5.8	25.4	33.6
740918	0417	3	5.8	25.4	33.5
740918	0742	1	5.8	24.8	33.3
740918	0743	2	5.7	24.8	33.5
740918	0744	3	5.8	24.8	33.5
740918	0745	4	5.8	24.8	33.5
740918	1045	1	5.0	26.2	36.8
740918	1046	2	4.8	26.0	36.5
740918	1047	3	4.8	26.0	36.5
740918	1048	4	4.8	26.1	36.5
740918	1049	5	4.8	26.0	36.5
740918	1305	1	6.3	26.4	35.4
740918	1306	2	6.3	26.6	36.0
740918	1307	3	6.3	26.6	36.3
740918	1308	4	6.3	26.6	36.6
740918	1309	5	6.3	26.6	36.6
740918	1615	1	7.5	26.7	34.4
740918	1616	2	7.6	26.7	34.0
740918	1617	3	7.5	26.7	34.0
740918	1618	4	7.5	26.7	34.0
740918	1835	1	7.4	26.2	32.2
740918	1836	2	7.2	26.2	32.2
740918	1837	3	7.2	26.2	32.3
740918	1838	4	7.1	26.2	32.3
740917					
NUMBER			37	37	37
MAXIMUM			7.6	26.7	36.8
MINIMUM			4.8	24.8	32.2
MEAN			6.2	26.1	34.5
740918					

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-08-D ATLANTIC BCH-N OF FT MACON BLVD

		00003 DEPTH	00299 DO PROBE	00010 WATER TEMP	00480 SALINITY
DATE	TIME	FEET	MG/L	CENT	PPTH
740919	1120	1	6.5	26.2	35.3
740919	1121	2	6.4	26.2	35.6
740919	1122	3	6.4	26.1	35.6
740919	1123	4	6.3	26.0	35.7
740919	1124	5	6.3	26.1	35.8
740919	1125	6	6.3	26.1	35.8
740919	1710	1	8.0	27.2	33.9
740919	1711	2	7.9	27.2	33.8
740919	1712	3	7.8	27.2	33.7
740919	2350	1	6.9	26.7	35.0
740919	2351	2	6.9	26.7	35.0
740919	2352	3	6.9	26.5	35.0
740919	2353	4	6.9	26.5	35.0
740919	2354	5	6.8	26.5	35.0
740919	2355	6	6.7	26.5	35.0
740920	0600	1	6.5	26.0	31.7
740920	0601	2	6.5	26.0	31.6
740920	0602	3	6.5	26.0	31.5
740920	0603	4	6.4	26.0	31.6
740920	1225	1	6.6		
740920	1226	2	6.2	27.0	35.6
740920	1227	3	6.4	27.0	35.7
740920	1228	4	6.4	27.0	35.9
740920	1229	5	6.4	27.0	35.8
740919					
NUMBER			24	23	23
MAXIMUM			8.0	27.2	35.9
MINIMUM			6.2	26.0	31.5
MEAN			6.7	26.5	34.5
740920					

APPENDIX B-2.4

```
            ENVIRONMENTAL PROTECTION AGENCY  REGION IV
       SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
            FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - AB-09-D          ATLANTIC BCH-N OF FT MACON BLVD
-------------------------------------------------------------
                        00003      00299      00010      00480
                        DEPTH       DO        WATER    SALINITY
                                   PROBE      TEMP
DATE    TIME            FEET       MG/L       CENT       PPTH

740919 1128               1         5.5       25.5       33.4
740919 1129               2         5.6       25.0       33.4
740919 1130               3         5.4       25.0       33.4
740919 1131               4         5.1       24.8       33.4
740919 1132               5         5.0       24.6       33.4
740919 1133               6         4.7       24.7       33.4
740919 1650               1         7.4       26.8       33.7
740919 1651               2         7.2       25.9       33.7
740919 1652               3         6.7       25.5       33.5
740919 2400               1         5.9       26.2       33.8
740920 0001               2         6.0       26.2       33.8
740920 0002               3         6.0       26.2       33.8
740920 0003               4         5.9       26.2       33.8
740920 0004               5         5.7       26.2       33.8
740920 0005               6         5.7       26.2       33.8
740920 0006               7         4.8       26.2       33.4
740920 0630               1         6.5       25.7       31.8
740920 0631               2         6.3       25.8       31.8
740920 0632               3         6.3       25.8       31.7
740920 1200               1         5.8       27.2       33.4
740920 1201               2         5.8       27.0       33.8
740920 1202               3         5.6       26.5       33.7
740920 1203               4         5.3       26.4       33.8
740920 1204               5         5.0       26.0       33.9
740920 1205               6         4.7       26.0       33.7

740919
   NUMBER                            25         25         25
   MAXIMUM                          7.4       27.2       33.9
   MINIMUM                          4.7       24.6       31.7
   MEAN                             5.8       25.9       33.4
740920
```

APPENDIX B-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-10-D ATLANTIC BCH-N OF FT MACON BLVD

		00003 DEPTH	00299 DO PROBE	00010 WATER TEMP	00480 SALINITY
DATE	TIME	FEET	MG/L	CENT	PPTH
740919	1140	1	6.0	25.6	33.4
740919	1141	2	6.0	25.6	33.4
740919	1142	3	6.0	25.6	33.4
740919	1143	4	6.0	25.6	33.4
740919	1144	5	6.0	25.5	33.4
740919	1145	6	6.0	25.5	33.4
740919	1146	7	6.0	25.6	33.4
740919	1147	8	6.0	25.5	33.3
740919	1700	1	7.4	28.4	33.2
740919	1701	2	7.4	28.5	33.6
740919	1702	3	7.2	28.0	33.6
740919	1703	4	6.9	27.8	33.6
740919	1704	5	6.9	27.2	34.0
740919	1705	6	6.4	27.0	34.2
740920	0015	1	6.5	26.4	33.9
740920	0016	2	6.5	26.4	33.9
740920	0017	3	6.4	26.4	33.9
740920	0018	4	6.3	26.4	33.9
740920	0019	5	6.2	26.4	33.9
740920	0020	6	6.1	26.3	33.9
740920	0021	7	5.8	26.3	33.9
740920	0022	8	5.8	26.3	33.9
740920	0640	1	5.4	25.5	31.4
740920	0641	2	5.6	25.5	31.8
740920	0642	3	5.4	25.5	31.8
740920	0643	4	5.5	25.6	31.8
740920	0644	5	5.4	25.5	31.8
740920	0645	6	5.0	25.5	31.8
740920	0646	7	5.0	25.4	31.6
740920	0647	8	4.9	25.5	31.8
740920	1215	1	6.4	27.2	33.4
740920	1216	2	6.3	27.1	33.7
740920	1217	3	6.2	26.8	33.8
740920	1218	4	6.2	26.8	33.6
740920	1219	5	6.2	26.7	33.7
740920	1220	6	6.2	26.6	33.5
740919					
NUMBER			36	36	36
MAXIMUM			7.4	28.5	34.2
MINIMUM			4.9	25.4	31.4
MEAN			6.1	26.3	33.2
740920					

APPENDIX B-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - SC-01-D   SPOONER CR-S OF N.C. HWY 24

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740923	2030	1	5.7	23.1	30.7
740923	2031	2	5.6	24.3	31.9
740923	2032	3	5.5	24.5	31.9
740923	2033	4	5.1	24.5	32.0
740923	2034	5	4.9	24.4	32.0
740923	2035	6	4.9	24.4	32.2
740923	2036	7	4.9	24.1	32.2
740923	2037	8	4.5	24.1	32.3
740924	0215	1	4.8	23.0	31.7
740924	0216	2	4.8	23.4	31.8
740924	0217	3	4.8	23.9	32.3
740924	0218	4	4.9	23.7	32.3
740924	0219	5	5.1	24.0	32.3
740924	0220	6	5.1	23.6	32.6
740924	0850	1	5.2	22.1	32.2
740924	0851	2	5.1	22.0	32.4
740924	0852	3	5.9	22.0	32.0
740924	0853	4	5.0	23.2	33.3
740924	0854	5	5.3	23.2	33.4
740924	0855	6	5.8	23.2	29.9
740924	1515	1	7.2	23.5	33.0
740924	1516	2	6.5	23.2	33.2
740924	1517	3	6.0	23.1	33.6
740924	1518	4	5.7	23.1	33.8
740924	1519	5	5.6	23.2	33.4
740923					
NUMBER			25	25	25
MAXIMUM			7.2	24.5	33.8
MINIMUM			4.5	22.0	29.9
MEAN			5.4	23.5	32.3
740924					

APPENDIX B-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - SC-02-D SPOONER CR-S OF N.C. HWY 24

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740923	2130	1	6.2	23.1	30.5
740923	2131	2	5.9	24.1	31.7
740923	2132	3	5.8	24.1	32.2
740923	2133	4	5.4	24.1	32.2
740923	2134	5	5.0	24.2	32.2
740923	2135	6	5.0	24.2	32.3
740924	0230	1	5.0	21.7	30.8
740924	0231	2	4.9	22.7	31.9
740924	0232	3	4.6	23.2	31.9
740924	0233	4	4.6	22.7	31.9
740924	0234	5	4.6	24.0	32.9
740924	0900	1	5.7	21.1	31.3
740924	0901	2	5.6	21.1	31.2
740924	0902	3	5.4	21.7	32.0
740924	0903	4	4.8	23.4	33.3
740924	0904	5	5.2	23.5	33.6
740924	1535	1	6.3	23.8	32.3
740924	1536	2	6.3	23.6	32.3
740924	1537	3	6.2	23.6	32.6
740924	1538	4	6.2	23.6	32.8
740924	1539	5	6.0	22.9	32.9
740924	1540	6	4.8	23.5	32.8
740923					
NUMBER			22	22	22
MAXIMUM			6.3	24.2	33.6
MINIMUM			4.6	21.1	30.5
MEAN			5.4	23.2	32.2
740924					

APPENDIX B-2.5

```
                ENVIRONMENTAL PROTECTION AGENCY  REGION IV
           SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                 FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - SC-03-D              SPOONER CR-E OF HARBOR DRIVE
------------------------------------------------------------
                      00003     00299     00010      00480
                      DEPTH      DO       WATER    SALINITY
                                PROBE     TEMP
DATE    TIME          FEET      MG/L      CENT       PPTH

740923 2145             1        5.4      24.0       32.2
740923 2146             2        5.2      24.1       32.6
740923 2147             3        5.2      24.4       32.6
740923 2148             4        4.9      24.4       32.9
740923 2149             5        4.5      24.7       32.9
740924 0240             1        4.2      22.9       32.4
740924 0241             2        4.2      23.0       32.2
740924 0242             3        3.7      24.5       32.2
740924 0243             4        4.4      24.6       32.6
740924 0913             1        5.3      23.4       32.6
740924 0914             2        4.9      23.9       33.8
740924 0915             3        5.3      23.5       33.6
740924 0926             4        5.0      23.5       33.6
740924 1550             1        7.0      24.2       33.2
740924 1551             2        6.9      24.3       33.2
740924 1552             3        7.0      24.3       33.4
740924 1553             4        6.9      24.1       33.5
740924 1554             5        6.8      24.0       33.5

740923
   NUMBER              18         18        18         18
   MAXIMUM              5        7.0      24.7       33.8
   MINIMUM              1        3.7      22.9       32.2
   MEAN                 3        5.4      24.0       32.9
740924
```

APPENDIX B-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - SC-04-D SPOONER CR-E OF HARBOR DRIVE

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH
740923	2150	1	6.5	23.6	31.7
740923	2151	2	6.4	23.6	32.0
740923	2152	3	6.4	23.8	32.0
740923	2153	4	6.4	23.8	32.2
740923	2154	5	6.4	23.8	32.2
740923	2155	6	6.3	23.8	34.1
740923	2156	7	6.3	23.5	34.1
740923	2157	8	6.3	23.5	34.2
740924	0250	1	5.9	22.3	31.7
740924	0251	2	5.9	22.3	31.9
740924	0252	3	6.0	22.3	31.9
740924	0253	4	5.9	22.2	31.9
740924	0254	5	5.8	22.2	32.0
740924	0255	6	5.6	21.6	32.0
740924	0256	7	5.3	21.0	32.6
740924	0257	8	5.2	21.0	32.8
740924	0935	1	6.0	21.0	32.5
740924	0936	2	5.9	21.3	32.2
740924	0937	3	5.9	21.3	32.2
740924	0938	4	5.8	21.4	32.2
740924	0939	5	5.5	21.3	23.9
740924	0940	6	5.4	21.1	32.8
740924	0941	7	5.3	20.8	33.4
740924	0942	8	5.3	20.8	33.4
740924	1600	1	6.5	22.4	32.1
740924	1601	2	6.5	22.4	32.6
740924	1602	3	6.8	22.5	33.0
740924	1603	4	7.0	22.7	33.2
740924	1604	5	7.0	22.7	33.4
740924	1605	6	7.0	22.7	33.5
740924	1606	7	7.1	22.4	33.7
740924	1607	8	7.1	22.0	34.0
740923					
NUMBER			32	32	32
MAXIMUM			7.1	23.8	34.2
MINIMUM			5.2	20.8	23.9
MEAN			6.1	22.3	32.4
740924					

APPENDIX B-2.5

```
                ENVIRONMENTAL PROTECTION AGENCY  REGION IV
          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - SC-05-D           SPOONER CR-NR INTRACOSTL WATRWAY
-----------------------------------------------------------------
                       00003        00299        00010        00480
                       DEPTH          DO         WATER      SALINITY
                                    PROBE        TEMP
DATE    TIME            FEET         MG/L         CENT         PPTH

740923 2200              1           6.8          22.6         33.8
740923 2201              2           6.8          22.6         33.8
740923 2202              3           6.8          23.0         33.8
740923 2203              4           6.7          23.0         33.9
740924 0305              1           6.3          22.1         33.8
740924 0306              2           6.3          22.2         33.7
740924 0307              3           6.3          22.2         33.9
740924 0308              4           6.4          22.2         33.9
740924 0945              1           6.6          20.9         33.0
740924 0946              2           6.6          20.9         33.0
740924 0947              3           6.5          20.9         33.0
740924 0948              4           6.5          20.9         33.0
740924 1615              1           7.3          22.2         34.7
740924 1616              2           7.3          22.0         34.5
740924 1617              3           7.2          22.0         34.4
740924 1618              4           7.2          22.0         34.4

740923
    NUMBER                            16           16           16
    MAXIMUM                          7.3         23.0         34.7
    MINIMUM                          6.3         20.9         33.0
    MEAN                             6.7         22.0         33.8
740924
```

APPENDIX B-2.5

```
             ENVIRONMENTAL PROTECTION AGENCY  REGION IV
        SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
             FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - SC-06-D          SPOONER CR-E OF HARBOR DRIVE
----------------------------------------------------------------
                      00003      00299       00010       00480
                      DEPTH       DO         WATER      SALINITY
                                 PROBE       TEMP
DATE    TIME          FEET       MG/L        CENT         PPTH

740923 2215             1         6.5        23.4         32.0
740923 2216             2         6.5        23.4         32.0
740923 2217             3         6.5        23.4         32.0
740923 2218             4         6.4        23.7         32.0
740923 2219             5         6.4        23.7         32.2
740923 2220             6         6.4        23.8         32.2
740923 2221             7         6.3        23.8         34.1
740924 0315             1         5.7        22.0         32.3
740924 0316             2         5.7        22.0         31.9
740924 0317             3         5.7        22.0         31.9
740924 0318             4         5.7        22.0         31.9
740924 0319             5         5.8        22.3         31.9
740924 0320             6         5.7        22.3         32.0
740924 0321             7         5.6        23.0         32.1
740924 0322             8         5.5        21.3         32.3
740924 0323             9         5.2        21.1         32.7
740924 0925             1         5.8        21.5         32.3
740924 0926             2         5.8        21.5         32.2
740924 0927             3         5.7        21.6         32.3
740924 0928             4         5.7        21.5         32.3
740924 0929             5         5.7        21.6         32.2
740924 0930             6         5.6        21.6         32.2
740924 0931             7         5.4        21.3         33.8
740924 0932             8         5.4        21.4         34.0
740924 1620             1         7.4        22.4         32.3
740924 1621             2         7.3        22.5         32.3
740924 1622             3         7.0        22.5         32.3
740924 1623             4         6.9        22.5         32.3
740924 1624             5         6.8        22.3         32.5
740924 1625             6         6.9        22.3         32.5
740924 1626             7         6.8        22.2         33.2
740924 1627             8         6.8        22.2         33.6

740923
    NUMBER                         32          32           32
    MAXIMUM                       7.4        23.8         34.1
    MINIMUM                       5.2        21.1         31.9
    MEAN                          6.1        22.3         32.4
740924
```

APPENDIX C

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

PAGE	PARAMETER	DESCRIPTION
1	00003	SAMPLING STATION LOCATION, VERTICAL (FEET)
1	00299	OXYGEN, DISSOLVED (ELECTRODE) (MG/L)
1	00010	TEMPERATURE, WATER (DEGREES CENTIGRADE)
1	00480	SALINITY - PARTS PER THOUSAND
1	00400	PH (STANDARD UNITS)
1	00310	BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C)
1	00680	CARBON, TOTAL ORGANIC (MG/L AS C)
1	00530	RESIDUE, TOTAL NONFILTRABLE (MG/L)
1	00535	RESIDUE, VOLATILE NONFILTRABLE (MG/L)
1	00610	NITROGEN, AMMONIA, TOTAL (MG/L AS N)
1	00630	NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)
1	00625	NITROGEN, KJELDAHL, TOTAL, (MG/L AS N)
1	00665	PHOSPHORUS, TOTAL (MG/L AS P)
1	00745	SULFIDE, TOTAL (MG/L AS S)
1	01045	IRON, TOTAL (UG/L AS FE)
1	01051	LEAD, TOTAL (UG/L AS PB)
1	01055	MANGANESE, TOTAL (UG/L AS MN)
1	01092	ZINC, TOTAL (UG/L AS ZN)
1	31616	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH,44.5 C
1	31501	COLIFORM,TOT,MEMBRANE FILTER,IMMED.M-ENDO MED,35C
1	00003	DEPTH IN FEET

```
                                ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                            SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                                    FINGER FILL CANAL STUDY  AUGUST 1974

PAGE  PARAMETER          DESCRIPTION

   1  00003            SAMPLING STATION LOCATION, VERTICAL (FEET)
   1  00680            CARBON, TOTAL ORGANIC (MG/L AS C)
   1  00610            NITROGEN, AMMONIA, TOTAL (MG/L AS N)
   1  00630            NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)
   1  00625            NITROGEN, KJELDAHL, TOTAL, (MG/L AS N)
   1  00665            PHOSPHORUS, TOTAL (MG/L AS P)
   1  00530            RESIDUE, TOTAL NONFILTRABLE (MG/L)
   1  00535            RESIDUE, VOLATILE NONFILTRABLE (MG/L)
   1  00003            DEPTH IN FEET
   3  00400            PH (STANDARD UNITS)
```

APPENDIX C-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - PG-01 PUNTA GORDA 50' FRM END CANAL #1 PEACE RIVER FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731111 0120	5	5.4	23.4	28.4	7.4	2.2	9.4	25
731111 0850	2	5.0	22.3	28.3	7.1	1.9	8.8	50
731112 0150	4	5.7	21.6	28.5	7.5	1.6	8.0	49
731112 1025	3	5.8	21.6	28.2	7.5	1.6	8.0	30
731111								
NUMBER		4	4	4	4	4	4	4
MAXIMUM		5.8	23.4	28.5	7.5	2.2	9.4	50
MINIMUM		5.0	21.6	28.2	7.1	1.6	8.0	25
MEAN		5.5	22.2	28.3	7.4	1.8	8.5	39
LOG MEAN		5.5	22.2	28.3	7.4	1.8	8.5	37
731112								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731111 0120	5	22	0.10	0.010K	0.10	0.20	1.00K
731111 0850	2	29	0.10	0.010K	0.32	0.17	1.00K
731112 0150	4	20	0.08	0.010K	0.42	0.17	1.00K
731112 1025	3	15	0.05	0.010K	0.30	0.17	1.00K
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		29	0.10	0.010K	0.42	0.20	1.00K
MINIMUM		15	0.05	0.010K	0.10	0.17	1.00K
MEAN		22	0.08		0.28	0.18	
LOG MEAN		21	0.08		0.25	0.18	
731112							

DATE TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731111 0120	1					7K	200
731111 0120	5	160	80K	40K	230		
731111 0850	1					7K	760
731111 0850	2	250	80K	40K	70		
731112 0150	1					33	1800
731112 0150	4	220	80K	40K	40		
731112 1025	1					27	2100
731112 1025	3	200	80K	40K	40		
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		250	80K	40K	230	33	2100
MINIMUM		160	80K	40K	40	7K	200
MEAN		208			95		1215
LOG MEAN		205			71		871
731112							

APPENDIX C-1.1

```
                      ENVIRONMENTAL PROTECTION AGENCY REGION IV
                  SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                      FINGER FILL CANAL STUDY   NOVEMBER 1973
                                  WATER QUALITY DATA
STATION - PG-02            PUNTA GORDA 1250' FM END CANAL#1  PEACE RIVER      FINGER FILL CANAL STUDY
-------------------------------------------------------------------------------------------------------
                     00003     00299      00010      00480      00400      00310      00680      00530
                     DEPTH      DO        WATER     SALINITY     PH         BOD      T ORG C    RESIDUE
                               PROBE      TEMP                             5 DAY        C       TOT NFLT
DATE   TIME          FEET      MG/L       CENT       PPTH       SU         MG/L       MG/L       MG/L

731111 0150            5        5.5       23.3       28.0       7.5        1.5        9.4         27
731111 0905            2        5.2       22.6       28.1       7.5        1.6        9.4         64
731112 0210            4        5.8       21.6       28.0       7.6        1.3        7.5         30
731112 1035            4        5.6       21.4       27.8       7.4        1.2        7.5         36

731111
  NUMBER
  MAXIMUM                         4          4          4          4          4          4          4
  MINIMUM                       5.8       23.3       28.1       7.6        1.6        9.4         64
  MEAN                          5.2       21.4       27.8       7.4        1.2        7.5         27
  LOG MEAN                      5.5       22.2       28.0       7.5        1.4        8.4         39
731112                          5.5       22.2       28.0       7.5        1.4        8.4         37
-------------------------------------------------------------------------------------------------------
                     00003     00535      00610      00630      00625      00665      00745
                     DEPTH    RESIDUE     NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   SULFIDE
                              VOL NFLT    TOTAL     N-TOTAL       N                   TOTAL
DATE   TIME          FEET      MG/L       MG/L       MG/L       MG/L       MG/L P     MG/L

731111 0150            5        22        0.08      0.010K      0.08       0.15      1.00K
731111 0905            2        38        0.08      0.010K      0.30       0.22      1.00K
731112 0210            4        22        0.10      0.010K      0.35       0.25      1.00K
731112 1035            4        21        0.08      0.010K      0.35       0.14      1.00K

731111
  NUMBER
  MAXIMUM                         4          4          4          4          4          4
  MINIMUM                        38       0.10      0.010K      0.35       0.25      1.00K
  MEAN                           21       0.08      0.010K      0.08       0.14      1.00K
  LOG MEAN                       26       0.08                  0.27       0.19
731112                           25       0.08                  0.23       0.18
-------------------------------------------------------------------------------------------------------
                     00003     01045      01051      01055      01092      31616      31501
                     DEPTH      IRON      LEAD      MANGNESE    ZINC      FEC COLI   TOT COLI
                               FE,TOT     PB,TOT       MN       ZN,TOT    MFM-FCBR   MFIMENDO
DATE   TIME          FEET      UG/L       UG/L       UG/L       UG/L      /100ML     /100ML

731111 0150            1                                                     20        500
731111 0150            5        160        80K        40K        100
731111 0905            1                                                     7K
731111 0905            2        430        80K        40K         30
731112 0210            1                                                     13        300
731112 0210            4         70        80K        40K         20
731112 1035            1                                                     7K        800
731112 1035            4        240        80K        40K         30

731111
  NUMBER
  MAXIMUM                         4          4          4          4          4          3
  MINIMUM                       430        80K        40K        100         20        800
  MEAN                           70        80K        40K         20         7K        300
  LOG MEAN                      225                               45                   533
731112                          184                               37                   493
```

APPENDIX C-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - PG-03 PUNTA GORDA 2500' FM END CANAL#1 PEACE RIVER FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731111	0215	3	5.4	21.8	28.2	7.6	1.1	9.2	37
731111	0915	2	5.4	22.1	28.0	7.5	1.3	9.4	118
731112	0225	3	5.8	20.1	28.0	7.6	2.4	8.1	43
731112	1045	2	6.1	21.5	28.0	7.5	0.9	7.5	40
731111									
NUMBER			4	4	4	4	4	4	4
MAXIMUM			6.1	22.1	28.2	7.6	2.4	9.4	118
MINIMUM			5.4	20.1	28.0	7.5	0.9	7.5	37
MEAN			5.7	21.4	28.0	7.5	1.4	8.5	60
LOG MEAN			5.7	21.4	28.0	7.5	1.3	8.5	52
731112									

DATE	TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731111	0215	3	32	0.10	0.030	0.80	0.14	1.00K
731111	0915	2	86	0.08	0.010K	0.70	0.12	1.00K
731112	0225	3	18	0.08	0.010K	0.42	0.21	1.00K
731112	1045	2	21	0.08	0.010K	0.35	0.19	1.00K
731111								
NUMBER			4	4	4	4	4	4
MAXIMUM			86	0.10	0.030	0.80	0.21	1.00K
MINIMUM			18	0.08	0.010K	0.35	0.12	1.00K
MEAN			39	0.08		0.57	0.16	
LOG MEAN			32	0.08		0.54	0.16	
731112								

DATE	TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731111	0215	1					7K	500
731111	0215	3	90	80K	40K	30		
731111	0915	1					33	300
731111	0915	2	950	80K	40K	40		
731112	0225	1					270	1200
731112	0225	3	180	80K	40K	20		
731112	1045	1					27	200
731112	1045	2	210	80K	40K	30		
731111								
NUMBER			4	4	4	4	4	4
MAXIMUM			950	80K	40K	40	270	1200
MINIMUM			90	80K	40K	20	7K	200
MEAN			358			30		550
LOG MEAN			238			29		436
731112								

APPENDIX C-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - PG-04 CHARLOTTE HARBOR BACKGROUND STA. PEACE RIVER FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731111 0230	2	5.7	22.6	28.3	7.6	1.2	8.0	32
731111 0940	1	5.5	21.1	26.5	7.3	0.8	9.4	40
731112 0240	2	6.9	20.8	28.2	7.7	2.0	8.0	48
731112 1105	2	5.7	20.9	26.6		0.7	7.4	23
731111								
NUMBER		4	4	4	3	4	4	4
MAXIMUM		6.9	22.6	28.3	7.7	2.0	9.4	48
MINIMUM		5.5	20.8	26.5	7.3	0.7	7.4	23
MEAN		5.9	21.3	27.4	7.5	1.2	8.2	36
LOG MEAN		5.9	21.3	27.4	7.5	1.1	8.2	34
731112								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731111 0230	2	22	0.05	0.010K	0.30	0.19	1.00K
731111 0940	1	36	0.14	0.030	0.30	0.16	1.00K
731112 0240	2	18	0.08	0.010K	0.35	0.17	1.00K
731112 1105	2	15	0.10	0.030	0.32	0.13	1.00K
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		36	0.14	0.030	0.35	0.19	1.00K
MINIMUM		15	0.05	0.010K	0.30	0.13	1.00K
MEAN		23	0.09		0.32	0.16	
LOG MEAN		22	0.09		0.32	0.16	
731112							

DATE TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731111 0230	1					20	300
731111 0230	2	140	80K	40K	40		
731111 0940	1	390	80K	40K	30	40	170
731112 0240	1					7K	55
731112 0240	2	100	80K	40K	30		
731112 1105	1					53	600
731112 1105	2	160	80K	40K	30		
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		390	80K	40K	40	53	600
MINIMUM		100	80K	40K	30	7K	55
MEAN		198			33		281
LOG MEAN		172			32		203
731112							

APPENDIX C-1.1

```
                    ENVIRONMENTAL PROTECTION AGENCY REGION IV
                SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                     FINGER FILL CANAL STUDY   NOVEMBER 1973
                              WATER QUALITY DATA

STATION - PG-05          PUNTA GORDA 50' FRM END CANAL #2  PEACE RIVER     FINGER FILL CANAL STUDY
----------------------------------------------------------------------------------------------------
                  00003      00299      00010      00480      00400      00310      00680      00530
                  DEPTH       DO        WATER    SALINITY      PH         BOD     T ORG C    RESIDUE
                             PROBE      TEMP                             5 DAY       C       TOT NFLT
DATE    TIME       FEET      MG/L       CENT       PPTH        SU        MG/L       MG/L       MG/L

731111 0300         3         3.8       23.3       28.2        7.5        1.2        9.2        44
731111 1010         1         4.4       22.7       28.0        7.4        0.8        6.1        50
731112 0320         3         4.5       21.9       27.8        7.3        0.8        7.5        25
731112 1145         2         5.3       22.3       27.6                   1.4        7.5        21

731111
   NUMBER                       4          4          4          3          4          4          4
   MAXIMUM                    5.3       23.3       28.2        7.5        1.4        9.2         50
   MINIMIM                    3.8       21.9       27.6        7.3        0.8        6.1         21
   MEAN                       4.5       22.5       27.9        7.4        1.0        7.6         35
   LOG MEAN                   4.5       22.5       27.9        7.4        1.0        7.5         33
731112
----------------------------------------------------------------------------------------------------
                  00003      00535      00610      00630      00625      00665      00745
                  DEPTH     RESIDUE     NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT    SULFIDE
                           VOL NFLT     TOTAL     N-TOTAL       N                    TOTAL
DATE    TIME       FEET      MG/L       MG/L       MG/L       MG/L      MG/L P       MG/L

731111 0300         3         31        0.14      0.050      0.35       0.17       1.00K
731111 1010         1         30        0.20      0.040      0.31       0.17       1.00K
731112 0320         3         20        0.22      0.050      0.42       0.14       1.00K
731112 1145         2         19        0.14      0.030      0.42       0.17       1.00K

731111
   NUMBER                       4          4          4          4          4          4
   MAXIMUM                     31       0.22      0.050       0.42       0.17      1.00K
   MINIMUM                     19       0.14      0.030       0.31       0.14      1.00K
   MEAN                        25       0.17      0.042       0.37       0.16
   LOG MEAN                    24       0.17      0.042       0.37       0.16
731112
----------------------------------------------------------------------------------------------------
                  00003      01045      01051      01055      01092      31616      31501
                  DEPTH      IRON      LEAD      MANGNESE    ZINC      FEC COLI   TOT COLI
                            FE,TOT     PB,TOT       MN       ZN,TOT    MFM-FCBR   MFIMENDO
DATE    TIME       FEET      UG/L       UG/L       UG/L       UG/L      /100ML     /100ML

731111 0300         1                                                    100        260
731111 0300         3         360        80K        40K        40
731111 1010         1         380        80K        40K        40        250        3900
731112 0320         1                                                    190        3300
731112 0320         3         140        80K        40K        30
731112 1145         1                                                    110        3200
731112 1145         2         220        80K        40K        30

731111
   NUMBER                       4          4          4          4          4          4
   MAXIMUM                    380        80K        40K         40        250       3900
   MINIMUM                    140        80K        40K         30        100        260
   MEAN                       275                               35        163       2665
   LOG MEAN                   255                               35        151       1809
731112
```

APPENDIX C-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - PG-06 PUNTA GORDA 1000' FM END CANAL#2 PEACE RIVER FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731111 0320	4	5.3	23.3	27.8	7.5	0.9	8.0	32
731111 1025	3	5.4	22.8	27.9	7.4	1.2	8.1	57
731112 0335	3	5.4	22.0	27.7	7.3	0.9	7.4	40
731112 1200	3	5.5	21.8	27.5		0.8	8.1	23
731111								
NUMBER		4	4	4	3	4	4	4
MAXIMUM		5.5	23.3	27.9	7.5	1.2	8.1	57
MINIMUM		5.3	21.8	27.5	7.3	0.8	7.4	23
MEAN		5.4	22.5	27.7	7.4	0.9	7.9	38
LOG MEAN		5.4	22.5	27.7	7.4	0.9	7.9	36
731112								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731111 0320	4	24	0.08	0.040	0.20	0.14	1.00K
731111 1025	3	26	0.14	0.040	0.32	0.19	1.00K
731112 0335	3	19	0.10	0.030	0.38	0.16	1.00K
731112 1200	3	12	0.10	0.030	0.38	0.15	1.00K
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		26	0.14	0.040	0.38	0.19	1.00K
MINIMUM		12	0.08	0.030	0.20	0.14	1.00K
MEAN		20	0.10	0.035	0.32	0.16	
LOG MEAN		19	0.10	0.035	0.31	0.16	
731112							

DATE TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731111 0320	1					7K	40
731111 0320	4	150	80K	40K	30		
731111 1025	1					7K	100
731111 1025	3	350	80K	40K	30		
731112 0335	1					13	800
731112 0335	3	150	80K	40K	25		
731112 1200	1					27	300
731112 1200	3	165	80K	40K	20		
731111							
NUMBER		4	4	4	4	4	4
MAXIMUM		350	80K	40K	30	27	800
MINIMUM		150	80K	40K	20	7K	40
MEAN		204			26		310
LOG MEAN		190			26		176
731112							

APPENDIX C-1.1

```
                          ENVIRONMENTAL PROTECTION AGENCY REGION IV
                      SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                          FINGER FILL CANAL STUDY   NOVEMBER 1973
                                    WATER QUALITY DATA
STATION - PG-07          PUNTA GORDA 2000' FM END CANAL#2  PEACE RIVER      FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------------
                     00003     00299     00010     00480     00400     00310     00680     00530
                     DEPTH      DO       WATER    SALINITY    PH        BOD     T ORG C   RESIDUE
                               PROBE     TEMP                          5 DAY       C      TOT NFLT
DATE    TIME          FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731111 0340            3        5.1       22.4      27.2      7.5       1.0       8.0        36
731111 1035            2        5.6       22.6      27.4      7.3       1.1       7.5        72
731112 0350            3        5.6       20.7      27.6      7.3       0.7       8.0        35
731112 1210            2        5.8       22.2      27.5                0.9       8.0        28

731111
   NUMBER                         4         4         4         3         4         4         4
   MAXIMUM                      5.8      22.6      27.6       7.5       1.1       8.0        72
   MINIMUM                      5.1      20.7      27.2       7.3       0.7       7.5        28
   MEAN                         5.5      22.0      27.4       7.4       0.9       7.9        43
   LOG MEAN                     5.5      22.0      27.4       7.4       0.9       7.9        40
731112
-----------------------------------------------------------------------------------------------------
                     00003     00535     00610     00630     00625     00665     00745
                     DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                              VOL NFLT   TOTAL    N-TOTAL       N                TOTAL
DATE    TIME          FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731111 0340            3         21      0.10     0.030      0.32      0.15     1.00K
731111 1035            2         27      0.10     0.040      0.35      0.18     1.00K
731112 0350            3         21      0.08     0.020      0.35      0.15     1.00K
731112 1210            2         24      0.10     0.020      0.38               1.00K

731111
   NUMBER                         4         4         4         4         3         4
   MAXIMUM                       27      0.10     0.040      0.38      0.18     1.00K
   MINIMUM                       21      0.08     0.020      0.32      0.15     1.00K
   MEAN                          23      0.09     0.027      0.35      0.16
   LOG MEAN                      23      0.09     0.026      0.35      0.16
731112
-----------------------------------------------------------------------------------------------------
                     00003     01045     01051     01055     01092     31616     31501
                     DEPTH      IRON     LEAD     MANGNESE   ZINC     FEC COLI  TOT COLI
                               FE,TOT    PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE    TIME          FEET      UG/L      UG/L      UG/L      UG/L     /100ML    /100ML

731111 0340            1                                                 13       200
731111 0340            3        160       80K       40K        30
731111 1035            1                                                 7K       100K
731111 1035            2        240       80K       40K        30
731112 0350            1                                                 7K       200
731112 0350            3         90       80K       40K        20
731112 1210            1                                                 13       300
731112 1210            2        140       80K       40K        20

731111
   NUMBER                         4         4         4         4         4         4
   MAXIMUM                      240       80K       40K        30        13       300
   MINIMUM                       90       80K       40K        20        7K       100K
   MEAN                         156                            25
   LOG MEAN                     144                            24
731112
```

APPENDIX C-1.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - PG-A PUNTA GORDA SPECIAL STATION PEACE RIVER FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731111 2320	2	6.0	22.0	28.3	6.5	4.0	8.1	200
731111								
NUMBER		1	1	1	1	1	1	1
MAXIMUM								
MINIMUM								
MEAN								
LOG MEAN								
731111								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731111 2320	2	70	0.17	0.030	0.63	0.48	1.00K
731111							
NUMBER		1	1	1	1	1	1
MAXIMUM							
MINIMUM							
MEAN							
LOG MEAN							
731111							

DATE TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731111 2320	1					7K	130
731111 2320	2	3500	80K	40	60		
731111							
NUMBER		1	1	1	1	1	1
MAXIMUM							
MINIMUM							
MEAN							
LOG MEAN							
731111							

APPENDIX C-1.1

```
                ENVIRONMENTAL PROTECTION AGENCY REGION IV
             SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                FINGER FILL CANAL STUDY   NOVEMBER 1973
                          WATER QUALITY DATA

STATION - PG-B           PUNTA GORDA SPECIAL STATION  PEACE RIVER     FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------
                  00003     00299     00010     00480     00400     00310     00680     00530
                  DEPTH      DO       WATER   SALINITY     PH        BOD     T ORG C   RESIDUE
                            PROBE     TEMP                          5 DAY       C      TOT NFLT
DATE   TIME       FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731111 2345         2        6.3      21.5      28.8      6.5       1.6       8.1        39

731111
    NUMBER                     1         1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731111
-----------------------------------------------------------------------------------------------
                  00003     00535     00610     00630     00625     00665     00745
                  DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                           VOL NFLT   TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME       FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731111 2345         2         28      0.10     0.030      0.42      0.25     1.00K

731111
    NUMBER                     1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731111
-----------------------------------------------------------------------------------------------
                  00003     01045     01051     01055     01092     31616     31501
                  DEPTH     IRON      LEAD    MANGNESE    ZINC    FEC COLI  TOT COLI
                           FE,TOT    PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME       FEET      UG/L      UG/L      UG/L      UG/L    /100ML    /100ML

731111 2345         1                                                 7K        67
731111 2345         2        280       80K       40K        50

731111
    NUMBER                     1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731111
```

APPENDIX C-1.1

```
                       ENVIRONMENTAL PROTECTION AGENCY REGION IV
                    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                         FINGER FILL CANAL STUDY   NOVEMBER 1973
                                   WATER QUALITY DATA
STATION - PG-C           PUNTA GORDA SPECIAL STATION  PEACE RIVER     FINGER FILL CANAL STUDY
------------------------------------------------------------------------------------------------
                    00003     00299     00010     00480     00400     00310     00680     00530
                    DEPTH      DO       WATER    SALINITY    PH        BOD     T ORG C   RESIDUE
                              PROBE     TEMP                          5 DAY       C      TOT NFLT
DATE   TIME         FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731112 0550           3        5.6      21.0      26.4       7.0       0.8       8.0       45

731112
   NUMBER                        1         1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
    LOG MEAN
731112
------------------------------------------------------------------------------------------------
                    00003     00535     00610     00630     00625     00665     00745
                    DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                             VOL NFLT   TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME         FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731112 0550           3        20       0.20     0.050      0.42      0.14     1.00K

731112
   NUMBER                        1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
    LOG MEAN
731112
------------------------------------------------------------------------------------------------
                    00003     01045     01051     01055     01092     31616     31501
                    DEPTH     IRON     LEAD     MANGNESE   ZINC     FEC COLI  TOT COLI
                             FE,TOT    PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME         FEET      UG/L      UG/L      UG/L      UG/L     /100ML    /100ML

731112 0550           1                                                 7K       200
731112 0550           3       220       80K       40K        40

731112
   NUMBER                        1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
    LOG MEAN
731112
```

APPENDIX C-1.1

```
                       ENVIRONMENTAL PROTECTION AGENCY REGION IV
                    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                         FINGER FILL CANAL STUDY   NOVEMBER 1973
                                    WATER QUALITY DATA

STATION - PG-D          PUNTA GORDA SPECIAL STATION  PEACE RIVER     FINGER FILL CANAL STUDY
------------------------------------------------------------------------------------------------
                    00003     00299     00010     00480     00400     00310     00680     00530
                    DEPTH      DO       WATER    SALINITY    PH        BOD     T ORG C   RESIDUE
                              PROBE     TEMP                          5 DAY       C      TOT NFLT
DATE   TIME          FEET     MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731111 1733            5       5.4      23.2      27.5       7.6       1.6       8.0       51

731111
   NUMBER                       1         1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
   LOG MEAN
731111
------------------------------------------------------------------------------------------------
                    00003     00535     00610     00630     00625     00665     00745
                    DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                             VOL NFLT   TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME          FEET     MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731111 1733            5       34       0.10      0.040     0.95      0.17     1.00K

731111
   NUMBER                       1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
   LOG MEAN
731111
------------------------------------------------------------------------------------------------
                    00003     01045     01051     01055     01092     31616     31501
                    DEPTH      IRON      LEAD    MANGNESE    ZINC    FEC COLI  TOT COLI
                              FE,TOT    PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME          FEET     UG/L      UG/L      UG/L      UG/L     /100ML    /100ML

731111 1730            1                                                7K       200
731111 1733            5       200       80K       40K        50

731111
   NUMBER                       1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
   LOG MFAN
731111
```

APPENDIX C-1.1

```
                      ENVIRONMENTAL PROTECTION AGENCY REGION IV
                  SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                        FINGER FILL CANAL STUDY   NOVEMBER 1973
                                 WATER QUALITY DATA
STATION - PG-E              PUNTA GORDA SPECIAL STATION  PEACE RIVER      FINGER FILL CANAL STUDY
--------------------------------------------------------------------------------------------------
                 00003     00299     00010     00480     00400     00310     00680     00530
                 DEPTH      DO       WATER   SALINITY     PH       BOD     T ORG C   RESIDUE
                           PROBE     TEMP                         5 DAY       C      TOT NFLT
DATE   TIME      FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L
731111 1804        4        4.9      23.6      27.4      7.4       1.6       8.1        42

731111
    NUMBER                    1         1         1        1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731111
--------------------------------------------------------------------------------------------------
                 00003     00535     00610     00630     00625     00665     00745
                 DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                          VOL NFLT   TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME      FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L
731111 1804        4        25       0.10     0.050      0.55      0.15     1.00K

731111
    NUMBER                   1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731111
--------------------------------------------------------------------------------------------------
                 00003     01045     01051     01055     01092     31616     31501
                 DEPTH     IRON      LEAD     MANGNESE   ZINC     FEC COLI  TOT COLI
                          FE,TOT    PB,TOT       MN     ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME      FEET      UG/L      UG/L      UG/L      UG/L     /100ML    /100ML
731111 1800        1
731111 1804        4       145       80K        40        50        7K       100

731111
    NUMBER                   1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
7.1111
```

APPENDIX C-1.2

```
                      ENVIRONMENTAL PROTECTION AGENCY REGION IV
                  SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                      FINGER FILL CANAL STUDY   NOVEMBER 1973
                                WATER QUALITY DATA

STATION - BPK-08          BIG PINE KEY 50' FM END CANAL #3  LOWER FLORIDA    FINGER FILL CANAL STUDY
---------------------------------------------------------------------------------------------------
                      00003     00299     00010     00480      00400     00310     00600     00530
                      DEPTH     DO        WATER    SALINITY    PH        BOD      T ORG C   RESIDUE
                                PROBE     TEMP                           5 DAY     C        TOT NFLT
DATE   TIME           FEET      MG/L      CENT      PPTH       SU        MG/L      MG/L      MG/L

731117 1201            5         6.0      24.0      37.4       8.0       0.8       3.3        74
731117 1816            5         5.9      24.0      37.5       7.9       0.5K      4.4        82
731118 0014            5         5.8      23.9      38.2       8.1       0.5K      3.3        69
731118 0640            5         5.4      24.0      38.2       8.5       0.5K      4.8        88
731118 1220            5         6.2      24.5      38.3       8.0       0.5K      3.7        66

731117
   NUMBER                          5         5         5         5         5         5          5
   MAXIMUM                       6.2      24.5      38.3       8.5       0.8       4.4         88
   MINIMUM                       5.4      23.9      37.4       7.9       0.5K      3.3         66
   MEAN                          5.9      24.1      37.9       8.1                 3.7         76
   LOG MEAN                      5.9      24.1      37.9       8.1                 3.7         75
731118
---------------------------------------------------------------------------------------------------
                      00003     00535     00610     00630      00625     00665     00745
                      DEPTH    RESIDUE    NH3-N    NO2&NO3    TOT KJEL  PHOS-TOT  SULFIDE
                               VOL NFLT   TOTAL    N-TOTAL       N                TOTAL
DATE   TIME           FEET      MG/L      MG/L      MG/L       MG/L     MG/L P     MG/L

731117 1201            5         25       0.05     0.010K      0.30      0.02     1.00K
731117 1816            5         20       0.05     0.010K      0.20      0.19     1.00K
731118 0014            5         13       0.05     0.010K      0.20      0.01K    1.00K
731118 0640            5         10       0.03     0.010K      0.20      0.01K    1.00K
731118 1220            5         25       0.04     0.010K      0.25      0.02     1.00K

731117
   NUMBER                          5         5         5          5         5         5
   MAXIMUM                        25      0.05     0.010K      0.30      0.19     1.00K
   MINIMUM                        10      0.03     0.010K      0.20      0.01K    1.00K
   MEAN                           19      0.04                 0.23
   LOG MEAN                       17      0.04                 0.23
731118
---------------------------------------------------------------------------------------------------
                      00003     01045     01051     01055      01092     31616     31501
                      DEPTH     IRON     LEAD      MANGNESE   ZINC      FEC COLI  TOT COLI
                               FE,TOT    PB,TOT      MN       ZN,TOT    MFM-FCBR  MFIMENDO
DATE   TIME           FEET      UG/L      UG/L      UG/L       UG/L     /100ML    /100ML

731117 1200            1                                                  5K        10K
731117 1201            5        100        80K       40K        60
731117 1815            1                                                  5K        10K
731117 1816            5         60K       80K       40K        30
731118 0013            1                                                  5K        10K
731118 0014            5         80        80K       40K        30
731118 0640            1                                                  5K        10
731118 0640            5         60K       80K       40K        20
731118 1220            1                                                  5K        10K
731118 1220            5         90        80K       40K        20K

731117
   NUMBER                          5         5         5          5         5         5
   MAXIMUM                       100       80K       40K         60        5K        10
   MINIMUM                        60K      80K       40K         20K       5K        10K
   MEAN
   LOG MEAN
731118
```

APPENDIX C-1.2

```
                    ENVIRONMENTAL PROTECTION AGENCY REGION IV
               SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                   FINGER FILL CANAL STUDY   NOVEMBER 1973
                             WATER QUALITY DATA

STATION - BPK-09          BIG PINE KEY 780' FM END CANAL#3  LOWER FLORIDA    FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------------
                  00003     00299      00010      00480      00400      00310      00680      00530
                  DEPTH      DO        WATER     SALINITY     PH         BOD      T ORG C    RESIDUE
                            PROBE      TEMP                             5 DAY        C      TOT NFLT
DATE    TIME      FEET      MG/L       CENT       PPTH       SU         MG/L       MG/L       MG/L

731117 1226         4        5.7       24.0       37.4       8.0        0.5K       2.5        87
731117 1831         5        5.9       24.0       37.5       8.0        0.5K       4.1        66
731118 0031         5        5.9       24.0       38.2       8.1        0.5K       4.0        77
731118 0620         5        5.6       23.9       38.2       8.6        0.5K       4.0        64
731118 1210         5        6.3       24.5       38.5       8.0        0.5K       3.7        82

731117
   NUMBER                      5          5          5          5          5          5         5
   MAXIMUM                   6.3       24.5       38.5        8.6       0.5K        4.1        87
   MINIMUM                   5.6       23.9       37.4        8.0       0.5K        2.5        64
   MEAN                      5.9       24.1       38.0        8.1                   3.7        75
   LOG MEAN                  5.9       24.1       38.0        8.1                   3.6        75
731118
-----------------------------------------------------------------------------------------------------
                  00003     00535      00610      00630      00625      ^0665      00745
                  DEPTH    RESIDUE     NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   SULFIDE
                           VOL NFLT    TOTAL     N-TOTAL       N                   TOTAL
DATE    TIME      FEET      MG/L       MG/L       MG/L        MG/L      MG/L P      MG/L

731117 1226         4        17        0.05      0.010K       0.25      0.01K      1.00K
731117 1831         5        20        0.05      0.010K       0.25      0.01K      1.00K
731118 0031         5        27        0.03      0.010K       0.20      0.01K      1.00K
731118 0620         5        17        0.05      0.010K       0.25      0.07       1.00K
731118 1210         5        12        0.04      0.010K       0.25      0.05       1.00K

731117
   NUMBER                     5          5          5           5          5          5
   MAXIMUM                   27        0.05      0.010K       0.25       0.07       1.00K
   MINIMUM                   12        0.03      0.010K       0.20       0.01K      1.00K
   MEAN                      19        0.04                   0.24
   LOG MEAN                  18        0.04                   0.24
731118
-----------------------------------------------------------------------------------------------------
                  00003     01045      01051      01055      01092      31616      31501
                  DEPTH      IRON      LEAD      MANGNESE    ZINC      FEC COLI   TOT COLI
                           FE,TOT     PB,TOT        MN      ZN,TOT    MFM-FCBR   MFIMENDO
DATE    TIME      FEET      UG/L       UG/L        UG/L      UG/L      /100ML     /100ML

731117 1225         1
731117 1226         4        60K        80K        40K        40          5         10K
731117 1830         1
731117 1831         5        60K        80K        40K        60          5K        10K
731118 0030         1
731118 0031         5        60K        80K        40K        30          5K        10K
731118 0620         1
731118 0620         5        70         80K        40K        20          5K        10K
731118 1210         1
731118 1210         5        60K        80K        40K        20K         5K        10K

731117
   NUMBER                     5          5          5          5          5          5
   MAXIMUM                   70         60K        40K        60          5         10K
   MINIMUM                   ^0K        80K        40K        20K         5K        10K
   MEAN
   LOG MEAN
731118
```

APPENDIX C-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - BPK-10 BIG PINE KEY 1560' FM END CANL#3 LOWER FLORIDA FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731117 1246	5	5.9	24.1	37.4	8.1	0.5K	2.5	72
731117 1906	5	6.5	24.0	37.5	8.1	0.5K	4.0	85
731118 0046	5	6.3	24.0	38.2	8.1	0.5K	4.0	74
731118 0600	5	5.8	24.0	38.2	8.5	0.5K	3.7	70
731118 1150	5	5.8	24.6	38.4	8.0	0.5K	4.0	51
731117								
NUMBER		5	5	5	5	5	5	5
MAXIMUM		6.5	24.6	38.4	8.5	0.5K	4.0	85
MINIMUM		5.8	24.0	37.4	8.0	0.5K	2.5	51
MEAN		6.1	24.1	37.9	8.2		3.6	70
LOG MEAN		6.1	24.1	37.9	8.2		3.6	69
731118								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731117 1246	5	25	0.05	0.010K	0.20	0.02	1.00K
731117 1906	5	19	0.03	0.010K	0.22	0.02	1.00K
731118 0046	5	13	0.05	0.010K	0.20	0.10	1.00K
731118 0600	5	18	0.04	0.010K	0.20	0.01K	1.00K
731118 1150	5	11	0.05	0.010K	0.20	0.09	1.00K
731117							
NUMBER		5	5	5	5	5	5
MAXIMUM		25	0.05	0.010K	0.22	0.10	1.00K
MINIMUM		11	0.03	0.010K	0.20	0.01K	1.00K
MEAN		17	0.04		0.20		
LOG MEAN		16	0.04		0.20		
731118							

DATE TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731117 1246	1					5K	10K
731117 1246	5	60K	80K	40K	20		
731117 1905	1					5K	10K
731117 1906	5	60K	80K	40K	20		
731118 0046	1					5K	10K
731118 0046	5	100	80K	40K	30		
731118 0600	1					5K	10K
731118 0600	5	60K	80K	40K	30		
731118 1150	1					5K	10K
731118 1150	5	70	80K	40K	30		
731117							
NUMBER		5	5	5	5	5	5
MAXIMUM		100	80K	40K	30	5K	10K
MINIMUM		60K	80K	40K	20	5K	10K
MEAN					26		
LOG MEAN					26		
731118							

APPENDIX C-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - BPK-11 BOGIE CHANNEL BACKGROUND STATION LOWER FLORIDA FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731117	1305	2	7.1	24.2	37.4	8.1	0.5K	2.7	75
731117	1925	2	6.9	24.0	37.5	8.0	0.5K	4.0	93
731118	0100	2	5.8	23.8	38.2	8.1	0.8	4.0	69
731118	0700	2	4.4	23.9	38.5	8.4	0.5K	3.7	56
731118	1240	2	7.6	25.0	37.8	8.1	0.5K	4.0	60
731117									
NUMBER			5	5	5	5	5	5	5
MAXIMUM			7.6	25.0	38.5	8.4	0.8	4.0	93
MINIMUM			4.4	23.8	37.4	8.0	0.5K	2.7	56
MEAN			6.4	24.2	37.9	8.1		3.7	71
LOG MEAN			6.2	24.2	37.9	8.1		3.6	69
731118									

DATE	TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731117	1305	2	24	0.05	0.010K	0.20	0.12	1.00K
731117	1925	2	18	0.05	0.010K	0.17	0.01K	1.00K
731118	0100	2	21	0.05	0.010K	0.20	0.02	
731118	0700	2	13	0.04	0.010K	0.20	0.01K	1.00K
731118	1240	2	13	0.04	0.010K	0.20	0.01K	1.00K
731117								
NUMBER			5	5	5	5	5	4
MAXIMUM			24	0.05	0.010K	0.20	0.12	1.00K
MINIMUM			13	0.04	0.010K	0.17	0.01K	1.00K
MEAN			18	0.05		0.19		
LOG MEAN			17	0.05		0.19		
731118								

DATE	TIME	00003 DEPTH FEET	01045 IRON FE.TOT UG/L	01051 LEAD PB.TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN.TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731117	1305	1					5K	10K
731117	1305	2	60K	80K	40K	50		
731117	1925	1					5K	10K
731117	1925	2	70	80K	40K	40		
731118	0100	1					5K	10K
731118	0100	2	60K	80K	40K	30		
731118	0700	1					5K	10K
731118	0700	2	160	80K	40K	20		
731118	1240	1					5K	10K
731118	1240	2	60K	80K	40K	20K		
731117								
NUMBER			5	5	5	5	5	5
MAXIMUM			160	80K	40K	50	5K	10K
MINIMUM			60K	80K	40K	20K	5K	10K
MEAN								
LOG MEAN								
731118								

APPENDIX C-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - BPK-12 BIG PINE KEY 50' FM END CANAL #4 LOWER FLORIDA FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731117	1331	5	5.1	24.7	37.2	8.1	0.5K	4.0	74
731117	1940	4	5.3	24.4	37.2	8.0	0.5K	4.7	102
731118	0116	4	5.0	24.5	38.2	8.6	1.2	4.1	70
731118	0720	5	4.4	24.2	38.2	8.4	0.6	4.0	60
731118	1305	5	4.9	25.2	38.1	7.9	0.5K	3.7	76
731117									
NUMBER			5	5	5	5	5	5	5
MAXIMUM			5.3	25.2	38.2	8.6	1.2	4.7	102
MINIMUM			4.4	24.2	37.2	7.9	0.5K	3.7	60
MEAN			4.9	24.6	37.8	8.2		4.1	76
LOG MEAN			4.9	24.6	37.8	8.2		4.1	75
731118									

DATE	TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731117	1331	5	20	0.08	0.010K	0.30	0.02	1.00K
731117	1940	4	21	0.08	0.010K	0.30	0.02	1.00K
731118	0116	4	11	0.08	0.010K	0.25	0.13	1.00K
731118	0720	5	14	0.05	0.010K	0.30	0.01K	1.00K
731118	1305	5	17	0.05	0.010K	0.20	0.02	1.00K
731117								
NUMBER			5	5	5	5	5	5
MAXIMUM			21	0.08	0.010K	0.30	0.13	1.00K
MINIMUM			11	0.05	0.010K	0.20	0.01K	1.00K
MEAN			17	0.07		0.27		
LOG MEAN			16	0.07		0.27		
731118								

DATE	TIME	00003 DEPTH FEET	01045 IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731117	1330	1					5K	10K
731117	1331	5	60K	80K	40K	45		
731117	1939	1					65	90
731117	1940	4	70	80K	40K	60		
731118	0115	1					25	30
731118	0116	4	60K	80K	40K	30		
731118	0720	1					45	50
731118	0720	5	70	80K	40K	20K		
731118	1365	1					5K	10K
731118	1305	5	700	80K	40K	20K		
731117								
NUMBER			5	5	5	5	5	5
MAXIMUM			700	80K	40K	60	65	90
MINIMUM			60K	80K	40K	20K	5K	10K
MEAN								
LOG MEAN								
731118								

APPENDIX C-1.2

```
                        ENVIRONMENTAL PROTECTION AGENCY REGION IV
                    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                         FINGER FILL CANAL STUDY   NOVEMBER 1973
                                  WATER QUALITY DATA
STATION - BPK-13          BIG PINE KEY 360' FM END CANAL#4  LOWER FLORIDA   FINGER FILL CANAL STUDY
------------------------------------------------------------------------------------------------------
                  00003     00299     00010     00480     00400     00310     00680     00530
                  DEPTH      DO       WATER    SALINITY    PH        BOD     T ORG C   RESIDUE
                            PROBE     TEMP                          5 DAY       C      TOT NFLT
DATE   TIME       FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731117 1355        4         5.5      24.7      37.2      8.0       0.5K      4.1        86
731117 1956        4         5.5      24.3      37.2      8.1       0.5K      5.0        66
731118 0131        4         5.0      24.2      37.9      8.1       1.0       4.4        94
731118 0740        4         4.6      24.2      38.2      8.4       0.6       4.1        51
731118 1320        3         5.4      25.3      38.2      8.0       0.8       4.1        63

731117
   NUMBER                     5         5         5         5         5         5          5
   MAXIMUM                  5.5      25.3      38.2       8.4       1.0       5.0         94
   MINIMUM                  4.6      24.2      37.2       8.0       0.5K      4.1         51
   MEAN                     5.2      24.5      37.7       8.1                 4.3         72
   LOG MEAN                 5.2      24.5      37.7       8.1                 4.3         70
731118
------------------------------------------------------------------------------------------------------
                  00003     00535     00610     00630     00625     00665     00745
                  DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                          VOL NFLT    TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME       FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731117 1355        4         23       0.08     0.010K     0.20      0.02      1.00K
731117 1956        4         12       0.05     0.010K     0.25      0.02      1.00K
731118 0131        4         19       0.05     0.010K     0.25      0.06      1.00K
731118 0740        4          9       0.04     0.010K     0.30      0.06      1.00K
731118 1320        3          8       0.05     0.010K     0.20      0.02      1.00K

731117
   NUMBER                     5         5         5         5         5          5
   MAXIMUM                   23      0.08     0.010K     0.30      0.06      1.00K
   MINIMUM                    8      0.04     0.010K     0.20      0.02      1.00K
   MEAN                      14      0.05                0.24      0.04
   LOG MEAN                  13      0.05                0.24      0.03
731118
------------------------------------------------------------------------------------------------------
                  00003     01045     01051     01055     01092     31616     31501
                  DEPTH     IRON      LEAD    MANGNESE    ZINC    FEC COLI  TOT COLI
                           FE.TOT    PB.TOT      MN      ZN.TOT   MFM-FCBR  MFIMENDO
DATE   TIME       FEET      UG/L      UG/L      UG/L      UG/L     /100ML    /100ML

731117 1355        1                                                 5K       10K
731117 1355        4         60K       80K       40K       20K
731117 1955        1                                                 78       220
731117 1956        4         70        80K       40K       20
731118 0130        1                                                 65        80
731118 0131        4         60K       80K       40K       40
731118 0740        1                                                 15        20
731118 0740        4         70        80K       40K       20
731118 1320        1                                                 5K       10K
731118 1320        3         60K       80K       40K       20K

731117
   NUMBER                     5         5         5         5         5          5
   MAXIMUM                   70        80K       40K       40        78        220
   MINIMUM                   60K       80K       40K       20K       5K        10K
   MEAN
   LOG MEAN
731118
```

APPENDIX C-1.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY NOVEMBER 1973
WATER QUALITY DATA

STATION - BPK-14 BIG PINE KEY 72[illegible] FM END CANAL#4 LOWER FLORIDA FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00299 DO PROBE MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00310 BOD 5 DAY MG/L	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L
731117 1406	4	5.1	24.5	37.2	8.0	0.7	4.1	84
731117 2011	4	5.4	24.2	37.1	8.1	2.6	10.5	173
731118 0145	4	5.2	24.1	38.2	8.6	0.7	4.0	49
731118 0800	4	4.6	24.4	38.3	8.4	0.5K	3.7	67
731118 1340	3	5.2	25.3	38.4	7.9	0.5K	4.9	66
731117								
NUMBER		5	5	5	5	5	5	5
MAXIMUM		5.4	25.3	38.4	8.6	2.6	10.5	173
MINIMUM		4.6	24.1	37.1	7.9	0.5K	3.7	49
MEAN		5.1	24.5	37.8	8.2		5.4	88
LOG MEAN		5.1	24.5	37.8	8.2		5.0	79
731118								

DATE TIME	00003 DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00745 SULFIDE TOTAL MG/L
731117 1406	4	20	0.05	0.010K	0.20	0.02	1.00K
731117 2011	4	44	0.05	0.010K	0.38	0.04	1.00K
731118 0145	4	11	0.08	0.010K	0.38	0.13	1.00K
731118 0800	4	17	0.05	0.010K	0.20	0.02	1.00K
731118 1340	3	14	0.05	0.010K	0.22	0.04	1.00K
731117							
NUMBER		5	5	5	5	5	5
MAXIMUM		44	0.08	0.010K	0.38	0.13	1.00K
MINIMUM		11	0.05	0.010K	0.20	0.02	1.00K
MEAN		21	0.06		0.28	0.05	
LOG MEAN		19	0.05		0.26	0.04	
731118							

DATE TIME	00003 DEPTH FEET	01045 · IRON FE,TOT UG/L	01051 LEAD PB,TOT UG/L	01055 MANGNESE MN UG/L	01092 ZINC ZN,TOT UG/L	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
731117 1405	1					5K	10K
731117 1406	4	760	80K	40K	20		
731117 2010	1					5K	10K
731117 2011	4	240	80K	40K	20		
731118 0145	1					5K	10K
731118 0145	4	180	80K	40K	40		
731118 0755	1					33	45
731118 0800	4	60K	80K	40K	20K		
731118 1340	1					5K	10K
731118 1340	3	60K	80K	40K	20K		
731117							
NUMBER		5	5	5	5	5	5
MAXIMUM		760	80K	40K	40	33	45
MINIMUM		60K	80K	40K	20K	5K	10K
MEAN							
LOG MEAN							
731118							

APPENDIX C-1.2

```
                    ENVIRONMENTAL PROTECTION AGENCY REGION IV
                 SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                     FINGER FILL CANAL STUDY   NOVEMBER 1973
                              WATER QUALITY DATA

STATION - BPK-F             BIG PINE KEY SPECIAL STATION  LOWER FLORIDA    FINGER FILL CANAL STUDY
------------------------------------------------------------------------------------------------------
                   00003      00299     00010     00480      00400     00310     00680      00530
                   DEPTH        DO      WATER    SALINITY     PH        BOD     T ORG C    RESIDUE
                               PROBE     TEMP                          5 DAY       C       TOT NFLT
DATE   TIME         FEET       MG/L      CENT      PPTH       SU       MG/L      MG/L       MG/L

731117 1721          4          5.1      24.6      37.1       8.1      0.5K      4.7         61

731117
    NUMBER                        1         1         1         1         1         1          1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
------------------------------------------------------------------------------------------------------
                   00003      00535     00610     00630      00625     00665     00745
                   DEPTH     RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT   SULFIDE
                            VOL NFLT    TOTAL    N-TOTAL       N                 TOTAL
DATE   TIME         FEET       MG/L      MG/L      MG/L       MG/L    MG/L P      MG/L

731117 1721          4          19       0.08     0.010K      0.25     0.06      1.00K

731117
    NUMBER                        1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
------------------------------------------------------------------------------------------------------
                   00003      01045     01051     01055      01092     31616     31501
                   DEPTH       IRON     LEAD     MANGNESE    ZINC     FEC COLI  TOT COLI
                             FE,TOT    PB,TOT       MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME         FEET       UG/L      UG/L      UG/L       UG/L    /100ML    /100ML

731117 1720          1                                                  5K        10K
731117 1721          4          60K       80K       40K        60

731117
    NUMBER                        1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
```

APPENDIX C-1.2

```
                       ENVIRONMENTAL PROTECTION AGENCY REGION IV
                    SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                         FINGER FILL CANAL STUDY   NOVEMBER 1973
                                   WATER QUALITY DATA

STATION - BPK-G           BIG PINE KEY SPECIAL STATION  LOWER FLORIDA    FINGER FILL CANAL STUDY
----------------------------------------------------------------------------------------------
                   00003     00299     00010     00480     00400     00310     00680     00530
                   DEPTH      DO       WATER    SALINITY    PH        BOD     T ORG C   RESIDUE
                            PROBE      TEMP                          5 DAY       C      TOT NFLT
DATE   TIME        FEET      MG/L      CENT      PPTH       SU       MG/L      MG/L      MG/L

731117 1620          5        3.0      24.2      37.2       8.0       1.3       5.5        37

731117
    NUMBER                     1         1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
----------------------------------------------------------------------------------------------
                   00003     00535     00610     00630     00625     00665     00745
                   DEPTH    RESIDUE    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  SULFIDE
                           VOL NFLT    TOTAL    N-TOTAL      N                 TOTAL
DATE   TIME        FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

731117 1620          5        31       0.03     0.010K     0.30      0.03     1.00K

731117
    NUMBER                     1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
----------------------------------------------------------------------------------------------
                   00003     01045     01051     01055     01092     31616     31501
                   DEPTH     IRON      LEAD    MANGNESE    ZINC    FEC COLI  TOT COLI
                            FE,TOT    PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME        FEET      UG/L      UG/L      UG/L      UG/L    /100ML    /100ML

731117 1620          5        60K       80K       40K        50
731117 1630          1                                                10K       10K

731117
    NUMBER                     1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
```

APPENDIX C-1.2

```
                         ENVIRONMENTAL PROTECTION AGENCY REGION IV
                       SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                           FINGER FILL CANAL STUDY   NOVEMBER 1973
                                     WATER QUALITY DATA
STATION - BPK-H             BIG PINE KEY SPECIAL STATION  LOWER FLORIDA    FINGER FILL CANAL STUDY
---------------------------------------------------------------------------------------------------------
                     00003     00400      00310     00680     00530     00535     00610     00630     00625
                     DEPTH       PH        BOD     T ORG C   RESIDUE   RESIDUE    NH3-N    NO2&NO3  TOT KJEL
                                          5 DAY       C     TOT NFLT  VOL NFLT   TOTAL    N-TOTAL      N
DATE   TIME           FEET       SU       MG/L      MG/L      MG/L      MG/L      MG/L      MG/L      MG/L

731117 1130             3        7.9      0.5K       2.5        60        21      0.08     0.020      0.25

731117
   NUMBER                          1         1         1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
    LOG MEAN
731117
---------------------------------------------------------------------------------------------------------
                     00003     00665      00745     01045     01051     01055     01092     31616     31501
                     DEPTH   PHOS-TOT   SULFIDE     IRON     LEAD     MANGNESE   ZINC    FEC COLI  TOT COLI
                                         TOTAL     FE,TOT   PB,TOT      MN      ZN,TOT   MFM-FCBR  MFIMENDO
DATE   TIME           FEET    MG/L P     MG/L      UG/L      UG/L      UG/L      UG/L    /100ML    /100ML

731117 1130             1                                                                    5K       10K
731117 1130             3     0.01K      1.00K      620       80K       40K        50

731117
   NUMBER                          1         1         1         1         1         1         1         1
   MAXIMUM
   MINIMUM
   MEAN
    LOG MEAN
731117
```

APPENDIX C-1.2

```
                      ENVIRONMENTAL PROTECTION AGENCY REGION IV
                   SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                        FINGER FILL CANAL STUDY   NOVEMBER 1973
                                 WATER QUALITY DATA

STATION - BPK-I          BIG PINE KEY SPECIAL STATION  LOWER FLORIDA    FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------------------
                  00003     00400     00310     00680     00530     00535     00610     00630     00625
                  DEPTH      PH        BOD     T ORG C   RESIDUE   RESIDUE    NH3-N    NO2&NO3   TOT KJEL
                                      5 DAY       C      TOT NFLT  VOL NFLT   TOTAL    N-TOTAL      N
DATE   TIME       FEET       SU       MG/L      MG/L      MG/L      MG/L      MG/L      MG/L      MG/L

731117 1150         3        7.9      0.5K       3.2        83        28      0.10     0.030      0.25

731117
    NUMBER                     1         1         1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
-----------------------------------------------------------------------------------------------------------
                  00003     00665     00745     01045     01051     01055     01092     31616     31501
                  DEPTH    PHOS-TOT  SULFIDE     IRON     LEAD     MANGNESE  ZINC      FEC COLI  TOT COLI
                                      TOTAL     FE,TOT    PB,TOT      MN     ZN,TOT    MFM-FCBR  MFIMENDO
DATE   TIME       FEET     MG/L P     MG/L      UG/L      UG/L      UG/L      UG/L     /100ML    /100ML

731117 1150         1                                                                      5K       10K
731117 1150         3      0.01K     1.00K       60K       80K       40K        20

731117
    NUMBER                     1         1         1         1         1         1         1         1
    MAXIMUM
    MINIMUM
    MEAN
    LOG MEAN
731117
```

APPENDIX C-2.1

```
                       ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                          FINGER FILL CANAL STUDY  AUGUST 1974
STATION - PG-01             PUNTA GORDA 50' FRM END CANAL #1  PEACE RIVER      FINGER FILL CANAL STUDY
----------------------------------------------------------------------------------------------------------
                   00003     00680      00610      00630      00625      00665      00530      00535     00400
                   DEPTH   T ORG C     NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   RESIDUE    RESIDUE      PH
                              C        TOTAL     N-TOTAL       N                 TOT NFLT   VOL NFLT
DATE    TIME        FEET     MG/L       MG/L       MG/L       MG/L      MG/L P      MG/L       MG/L       SU

740814 1245           5      15.0       0.24       0.04       0.73       0.36        3          1K       7.3
740814 1620           4      14.0       0.27       0.03       0.73       0.38        4          1        7.3
740814 2115           4      12.0       0.15       0.03       0.73       0.34        6          1        7.2
740815 0530           4      14.0       0.20       0.01K      0.62       0.33       11          6
740815 1345           5      15.0       0.25       0.01K      0.62       0.37        8          3        7.2
740815 1346           8      15.0       4.88       0.01K      4.88       1.56

740814
    NUMBER                     6          6          6          6          6          5          5         4
    MAXIMUM                 15.0       4.88       0.04       4.88       1.56         11          6       7.3
    MINIMUM                 12.0       0.15       0.01K      0.62       0.33          3          1K      7.2
    MEAN                    14.2       1.00       0.02       1.38       0.56          6          2       7.2
740815


STATION - PG-02             PUNTA GORDA 1250' FM END CANAL#1  PEACE RIVER      FINGER FILL CANAL STUDY
----------------------------------------------------------------------------------------------------------
                   00003     00680      00610      00630      00625      00665      00530      00535     00400
                   DEPTH   T ORG C     NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   RESIDUE    RESIDUE      PH
                              C        TOTAL     N-TOTAL       N                 TOT NFLT   VOL NFLT
DATE    TIME        FEET     MG/L       MG/L       MG/L       MG/L      MG/L P      MG/L       MG/L       SU

740814 1340           5      15.0       0.22       0.03       1.55       0.39        5          2        7.1
740814 1640           5      13.0       0.24       0.03       1.17       0.39        4          1K       7.2
740814 2107           4      12.0       0.13       0.04       0.65       0.30        6          1K       7.2
740815 0550           4      15.0       0.15       0.01K      0.65       0.33        4          2
740815 1400           5      14.0       0.15       0.01K      0.59       0.36        5          2        7.3
740815 1401           8      13.0       7.60       0.01K      8.40       2.24

740814
    NUMBER                     6          6          6          6          6          5          5         4
    MAXIMUM                 15.0       7.60       0.04       8.40       2.24          6          2       7.3
    MINIMUM                 12.0       0.13       0.01K      0.59       0.30          4          1K      7.1
    MEAN                    13.7       1.41       0.02       2.17       0.67          5          2       7.2
740815
```

APPENDIX C-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION - PG-03 PUNTA GORDA 2500' FM END CANAL#1 PEACE RIVER FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740814	1230	3	15.0	0.16	0.04	0.74	0.32		
740814	1300	3						5	2
740814	1330	3	15.0	0.16	0.04	0.73	0.35		
740814	1400	3						5	2
740814	1430	3	15.0	0.16	0.04	0.73	0.36		
740814	1500	3						5	1
740814	1530	3	15.0	0.16	0.04	0.88	0.36		
740814	1600	3						8	2
740814	1630	3	14.0						
740814	1700	3						6	1
740814	1730	3	17.0	0.13	0.04	0.55	0.34		
740814	1800	3						8	2
740814	1830	3	15.0	0.12	0.04	0.68	0.30		
740814	1900	3						8	2
740814	1930	3	17.0	0.10	0.04	0.78	0.32		
740814	2000	3						6	2
740814	2030	3	17.0	0.10	0.04	0.65	0.32		
740814	2100	3						8	2
740814	2130	3	17.0	0.09	0.05	0.68	0.30		
740814	2200	3						11	4
740814	2230	3	16.0	0.10	0.04	0.68	0.27		
740814	2300	3						11	3
740814	2330	3	16.0	0.14	0.04	0.58	0.28		
740814	2400	3						12	5
740815	0030	3	16.0	0.15	0.01K	0.60	0.34		
740815	0100	3						8	2
740815	0130	3	16.0	0.12	0.01K	0.70	0.32		
740815	0200	3						6	2
740815	0230	3	16.0	0.15	0.01K	0.60	0.32		
740815	0300	3						6	2
740815	0330	3	15.0	0.10	0.01K	0.60	0.34		
740815	0400	3						6	2
740815	0430	3	14.0	0.10	0.01K	0.76	0.32		
740815	0500	3						5	1
740815	0530	3	15.0	0.10	0.01K	0.76	0.35		
740815	0600	3						6	2
740815	0630	3	15.0	0.10	0.01K	0.62	0.28		
740815	0700	3						5	2
740815	0730	3	14.0	0.10	0.05	0.65	0.24		
740815	0800	3						6	2
740815	0830	3	15.0	0.10	0.01	0.65	0.28		
740815	0900	3						6	1
740815	0930	3	15.0	0.10	0.01	0.76	0.34		
740815	1000	3						6	4
740815	1030	3	15.0	0.10	0.01	0.60	0.36		
740815	1100	3						6	4
740815	1130	3	15.0	0.10	0.01K	0.70	0.34		
740815	1200	3						9	4
740815	1230	3	15.0	0.07	0.01K	0.65	0.34		
740815	1300	3						6	3
740814									
NUMBER			25	24	24	24	24	25	25
MAXIMUM			17.0	0.16	0.05	0.88	0.36	12	5
MINIMUM			14.0	0.07	0.01K	0.55	0.24	5	1
MEAN			15.4	0.12	0.03	0.69	0.32	7	2
740815									

APPENDIX C-2.1

```
                         ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                            FINGER FILL CANAL STUDY  AUGUST 1974

STATION - PG-04           CHARLOTTE HARBOR BACKGROUND STA.  PEACE RIVER  .   FINGER FILL CANAL STUDY
------------------------------------------------------------------------------------------------------
                   00003     00680     00610     00630     00625     00665     00530     00535     00400
                   DEPTH    T ORG C    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  RESIDUE   RESIDUE     PH
                               C       TOTAL    N-TOTAL      N                TOT NFLT  VOL NFLT
DATE   TIME        FEET      MG/L      MG/L      MG/L      MG/L      MG/L P    MG/L      MG/L       SU

740814 1410          3       14.0      0.17      0.02      0.68      0.42         8         2      7.8
740814 1710          3       15.0      0.20      0.03      0.84      0.32         6         2      7.2
740814 2130          3       14.0      0.16      0.08      0.80      0.36        10         2      7.4
740815 0615          3       17.0      0.15      0.01K     0.70      0.44         4         2
740815 1430          3       14.0      0.04      0.04      0.50      0.40         6         4      8.4

740814
   NUMBER                       5         5         5         5         5         5         5        4
   MAXIMUM                   17.0      0.20      0.08      0.84      0.44        10         4      8.4
   MINIMUM                   14.0      0.04      0.01K     0.50      0.32         4         2      7.2
   MEAN                      14.8      0.14      0.04      0.70      0.39         7         2      7.7
740815
```

APPENDIX C-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION - PG-05 PUNTA GORDA 50' FRM END CANAL #2 PEACE RIVER FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00400 PH SU
740814	1445	4	13.0	3.30	0.12	3.76	1.04	16	9	6.8
740814	1745	4	17.0	0.09	0.05	0.60	0.17	4	2	7.3
740814	2100	4	13.0	0.11	0.05	0.68	0.17	3	2	7.2
740815	0640	3	16.0	0.12	0.05	0.62	0.18	5	3	
740815	1230	4	16.0	0.15	0.07	0.62	0.18	6	2	7.2
740815	1310	7	16.0	8.25	0.01K	8.80	2.16			
740814										
NUMBER			6	6	6	6	6	5	5	4
MAXIMUM			17.0	8.25	0.12	8.80	2.16	16	9	7.3
MINIMUM			13.0	0.09	0.01K	0.60	0.17	3	2	6.8
MEAN			15.2	2.00	0.06	2.51	0.65	7	4	7.1
740815										

STATION - PG-06 PUNTA GORDA 1000' FM END CANAL#2 PEACE RIVER FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00400 PH SU
740814	1500	4	14.0	0.17	0.04	0.70	0.25	4	3	7.0
740814	1750	4	14.0	0.13	0.04	0.68	0.24	5	4	7.4
740814	2105	3	12.0	0.12	0.04	0.68	0.20	6	4	7.2
740815	0655	3	15.0	0.17	0.05	0.62	0.10	6	4	
740815	1250	4	14.0	0.15	0.05	0.65	0.22	6	4	7.2
740815	1315	7	22.0	8.85	0.01K	9.50	2.64			
740814										
NUMBER			6	6	6	6	6	5	5	4
MAXIMUM			22.0	8.85	0.05	9.50	2.64	6	4	7.4
MINIMUM			12.0	0.12	0.01K	0.62	0.10	4	3	7.0
MEAN			15.2	1.60	0.04	2.14	0.61	5	4	7.2
740815										

APPENDIX C-2.1

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION - PR-07 PUNTA GORDA 2000' FM END CANAL#2 PEACE RIVER FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740814	1300	3	16.0	0.16	0.04	0.70	0.22		
740814	1330	3						5	3
740814	1400	3	15.0	0.17	0.04	0.70	0.24		
740814	1430	3						8	4
740814	1500	3	14.0	0.16	0.03	0.80	0.22		
740814	1530	3						8	4
740814	1600	3	15.0	0.13	0.03	0.82	0.25		
740814	1630	3						8	6
740814	1700	3	15.0	0.15	0.01	0.70	0.25		
740814	1730	3						8	6
740814	1800	3	15.0	0.15	0.01	0.80	0.28		
740814	1830	3						8	5
740814	1900	3	14.0	0.10	0.01	0.82	0.22		
740814	1930	3						8	6
740814	2000	3	14.0	0.10	0.01	0.55	0.20		
740814	2030	3						8	6
740814	2100	3	14.0	0.13	0.01	0.55	0.21		
740814	2130	3						9	8
740814	2200	3	15.0	0.10	0.01	0.61	0.20		
740814	2230	3						10	7
740814	2300	3	15.0	0.10	0.01	0.60	0.21		
740814	2330	3						9	2
740814	2400	3	16.0	0.10	0.01	0.65	0.15		
740815	0030	3						8	8
740815	0100	3	15.0	0.10	0.01	0.65	0.18		
740815	0130	3						9	8
740815	0200	3	15.0	0.10	0.01	0.61	0.20		
740815	0230	3						8	5
740815	0300	3	15.0	0.10	0.01	0.62	0.17		
740815	0330	3						8	6
740815	0400	3	14.0	0.07	0.01	0.55	0.17		
740815	0430	3						11	4
740815	0500	3	15.0	0.55	0.01	0.60	0.17		
740815	0530	3						6	4
740815	0600	3	16.0	0.10	0.01	0.61	0.18		
740815	0630	3						9	6
740815	0700	3	16.0	0.10	0.01	0.60	0.18		
740815	0730	3						8	6
740815	0800	3	16.0	0.10	0.01	0.60	0.19		
740815	0830	3						8	5
740815	0900	3	16.0	0.10	0.01	0.62	0.22		
740815	0930	3						10	4
740815	1000	3	15.0	0.10	0.01	0.72	0.22		
740815	1030	3						8	6
740815	1100	3	19.0	0.10	0.01	0.62	0.21		
740815	1130	3						8	5
740815	1200	3	15.0	0.17	0.01	0.62	0.22		
740815	1230	3						8	6
740815	1300	3	15.0	0.10	0.01	0.60	0.20		
740814									
NUMBER			25	25	25	25	25	24	24
MAXIMUM			19.0	0.55	0.04	0.82	0.28	11	7
MINIMUM			14.0	0.07	0.01	0.55	0.15	5	2
MEAN			15.2	0.13	0.01	0.64	0.21	8	5
740815									

APPENDIX C-2.2

```
                    ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                    FINGER FILL CANAL STUDY  AUGUST 1974

STATION - BPK-08          BIG PINE KEY 50' FM END CANAL #3  LOWER FLORIDA    FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------------
                 00003     00680     00610      00630     00625     00665     00530     00535     00400
                 DEPTH   T ORG C    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT   RESIDUE   RESIDUE      PH
                             C      TOTAL    N-TOTAL      N                TOT NFLT  VOL NFLT
DATE   TIME       FEET      MG/L     MG/L       MG/L      MG/L    MG/L P      MG/L      MG/L      SU

740819 1345         5       5.0      0.13                0.15      0.03         3         3      8.1
740819 2025         5       5.0      0.05       0.01     0.20      0.03        10         6
740820 0140         5       2.0      0.07       0.01K    0.25      0.04        20         6
740820 0740         5       2.0      0.07       0.01K    0.22      0.04         5        1K
740820 1320         5       2.9      0.12       0.01     0.38      0.04         4         1

740819
   NUMBER                     5         5          4        5         5         5         5        1
   MAXIMUM                  5.0      0.13       0.01     0.38      0.04        20         6
   MINIMUM                  2.0      0.05       0.01K    0.15      0.03         3        1K
   MEAN                     3.4      0.09       0.01     0.24      0.04         8         3
740820

STATION - BPK-09          BIG PINE KEY 780' FM END CANAL#3  LOWER FLORIDA    FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------------
                 00003     00680     00610      00630     00625     00665     00530     00535     00400
                 DEPTH   T ORG C    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT   RESIDUE   RESIDUE      PH
                             C      TOTAL    N-TOTAL      N                TOT NFLT  VOL NFLT
DATE   TIME       FEET      MG/L     MG/L       MG/L      MG/L    MG/L P      MG/L      MG/L      SU

740819 1355         5       4.1      0.25       0.01     0.30      0.03        26        13      8.1
740819 2050         5       2.0      0.07       0.01     0.20      0.03         9         7
740820 0200         5       2.0      0.07       0.01K    0.22      0.04         3        1K
740820 0750         5       2.0      0.06       0.01     0.22      0.03         6         2
740820 1330         5       1.0      0.05       0.01     0.25      0.03         2         2

740819
   NUMBER                     5         5          5        5         5         5         5        1
   MAXIMUM                  4.1      0.25       0.01     0.30      0.04        26        13
   MINIMUM                  1.0      0.05       0.01K    0.20      0.03         2        1K
   MEAN                     2.2      0.10       0.01     0.24      0.03         9         5
740820
```

APPENDIX C-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION - BPK-10 BIG PINE KEY 1500' FM END CANL#3 LOWER FLORIDA FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740819	1300	5	2.5	0.07		0.25	0.04		
740819	1330	5							
740819	1400	5	2.5	0.07	0.01	0.15	0.04	3	2
740819	1430	5							
740819	1500	5	2.0	0.10		0.15	0.04	2	1
740819	1530	5							
740819	1600	5	2.0	0.07		0.22	0.04	3	1K
740819	1630	5							
740819	1700	5	2.0	0.07		0.22	0.04	2	1K
740819	1730	5							
740819	1800	5	2.0	0.05		0.15	0.04	3	1K
740819	1830	5							
740819	1900	5	1.5	0.03		0.20	0.04	3	1K
740819	1930	5							
740819	2000	5	1.5	0.05		0.15	0.04	6	2
740819	2030	5							
740819	2100	5	2.0	0.05		1.75	0.04	4	1K
740819	2130	5							
740819	2200	5	2.5	0.05		0.24	0.04	6	2
740819	2230	5							
740819	2300	5	1.5	0.07		0.15	0.04	4	1K
740819	2330	5							
740819	2400	5	1.5	0.05	0.01K	0.28	0.03	4	1K
740820	0030	5							
740820	0100	5	1.5	0.10	0.01K	0.20	0.03	5	2
740820	0130	5							
740820	0200	5	2.0	0.05	0.01K	0.22	0.04	2	2
740820	0230	5							
740820	0300	5	1.5	0.07	0.01K	0.20	0.03	3	2
740820	0330	5							
740820	0400	5	1.1	0.05	0.01K	0.15	0.03	3	2
740820	0430	5							
740820	0500	5	2.5	0.10	0.01K	0.20	0.04	4	2
740820	0600	5	2.0	0.07	0.01K	0.22	0.04		
740820	0630	5							
740820	0700	5	1.1	0.05	0.01K	0.20	0.04	2	1
740820	0730	5							
740820	0800	5	1.1	0.07	0.01K	0.20	0.04	1K	1K
740820	0830	5							
740820	0900	5	1.5	0.07	0.01K	0.22	0.04	2	1K
740820	0930	5							
740820	1000	5	1.1	0.07	0.01K	0.20	0.04	2	2
740820	1030	5							
740820	1100	5	1.1	0.07	0.01	0.12	0.04	2	1K
740820	1130	5							
740820	1200	5	1.1	0.07	0.01	0.15	0.04	2	1K
740820	1230	5							
740820	1300	5	2.9	0.07	0.01	0.20	0.04	23	9
740820	1330	5							
740820	1400	5	2.9	0.07	0.01K	0.25	0.04	5	4
740819									
NUMBER			26	26	16	26	26	24	24
MAXIMUM			2.9	0.10	0.01	1.75	0.04	23	9
MINIMUM			1.1	0.03	0.01K	0.12	0.03	1K	1K
MEAN			1.8	0.07	0.01	0.26	0.04	4	2
740820									

APPENDIX C-2.2

```
                    ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                  SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                       FINGER FILL CANAL STUDY  AUGUST 1974

STATION - BPK-11          BOGIE CHANNEL BACKGROUND STATION  LOWER FLORIDA    FINGER FILL CANAL STUDY
-----------------------------------------------------------------------------------------------
                  00003     00680     00610     00630     00625     00665     00530     00535
                  DEPTH    T ORG C    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  RESIDUE   RESIDUE
                             C        TOTAL    N-TOTAL      N                TOT NFLT  VOL NFLT
DATE    TIME      FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L      MG/L

740819 1415         2        1.1      0.05      0.01K     0.25      0.04        3         1K
740819 2120         2        1.0      0.10      0.01      0.15      0.04        4         1K
740820 0230         2        1.1      0.07      0.01      0.12      0.04        3         1
740820 0810         2        1.1      0.07      0.01      0.10      0.04        3         1
740820 1320         2        2.8      0.07      0.01      0.25      0.04        1K        1K

740819
   NUMBER                      5         5         5         5         5         5         5
   MAXIMUM                   2.8      0.10      0.01      0.25      0.04         4         1
   MINIMUM                   1.0      0.05      0.01K     0.10      0.04         1K        1K
   MEAN                      1.4      0.07      0.01      0.17      0.04         3         1
740820


STATION - BPK-12          BIG PINE KEY 50' FM END CANAL #4  LOWER FLORIDA    FINGER FILL CANAL STUDY
---------------------------------------------------------------------------------------------------------
                  00003     00680     00610     00630     00625     00665     00530     00535     00400
                  DEPTH    T ORG C    NH3-N    NO2&NO3   TOT KJEL  PHOS-TOT  RESIDUE   RESIDUE     PH
                             C        TOTAL    N-TOTAL      N                TOT NFLT  VOL NFLT
DATE    TIME      FEET      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L      MG/L       SU

740819 1435         5        2.9      0.07      0.01K     0.28      0.04        3         1K       7.8
740819 2120         5        2.9      0.12      0.01K     0.22      0.04        6         2
740820 0305         5        2.8      0.12      0.01K     0.25      0.04        5         4
740820 0835         5        2.0      0.15      0.01      0.25      0.04        5         4
740820 1430         5        2.9      0.10      0.01      0.22      0.04        4         3

740819
   NUMBER                      5         5         5         5         5         5         5         1
   MAXIMUM                   2.9      0.15      0.01      0.28      0.04         6         4
   MINIMUM                   2.0      0.07      0.01K     0.22      0.04         3         1K
   MEAN                      2.7      0.11      0.01      0.24      0.04         5         3
740820
```

APPENDIX C-2.2

```
                            ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                         SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                                FINGER FILL CANAL STUDY  AUGUST 1974

STATION - BPK-13          BIG PINE KEY 300' FM END CANAL#4  LOWER FLORIDA    FINGER FILL CANAL STUDY
--------------------------------------------------------------------------------------------------------------
                  00003     00680     00610     00630     00625     00665     00530     00535     00400
                  DEPTH   T ORG C    NH3-N   NO2&NO3   TOT KJEL  PHOS-TOT   RESIDUE   RESIDUE      PH
                              C      TOTAL   N-TOTAL       N               TOT NFLT  VOL NFLT
DATE    TIME      FEET      MG/L      MG/L      MG/L      MG/L    MG/L P      MG/L      MG/L      SU

740819 1445          4       1.5      0.10     0.01K      0.35      0.04         2         2      8.0
740819 2205          4       1.5      0.10     0.01K      0.30      0.04         4         1
740820 0320          4       2.0      0.12      0.01      0.35      0.04         5         4
740820 0850          4       2.0      0.07      0.01      0.30      0.03         7         3
740820 1420          4       2.0      0.07      0.01      0.20      0.03         3        1K

740819
   NUMBER                      5         5         5         5         5         5         5         1
   MAXIMUM                   2.0      0.12      0.01      0.35      0.04         7         4
   MINIMUM                   1.5      0.07     0.01K      0.20      0.03         2        1K
   MEAN                      1.8      0.09      0.01      0.30      0.04         4         2
740820
```

APPENDIX C-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION = BPK-14 BIG PINE KEY 725' FR END CANAL#4 LOWER FLORIDA FINGER FILL CANAL STUDY

DATE	TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740819	1300	4	2.5	0.10	0.01K	0.20	0.04		
740819	1330	4						4	1
740819	1400	4	2.5	0.07	0.01K	0.15	0.04		
740819	1430	4						3	2
740819	1500	4	2.0	0.11	0.01K	0.22	0.04		
740819	1530	4						3	2
740819	1600	4	2.0	0.12	0.01K	0.28	0.04		
740819	1630	4						4	2
740819	1700	4	2.0	0.10	0.01K	0.28	0.04		
740819	1730	4						3	2
740819	1800	4	2.0	0.12	0.01K	0.28	0.04		
740819	1830	4						2	1K
740819	1900	4	2.8	0.10	0.01K	0.28	0.04		
740819	1930	4						4	2
740819	2000	4	2.0	0.12	0.01K	0.22	0.04		
740819	2030	4						4	1
740819	2100	4	2.9	0.07	0.01K	0.22	0.04		
740819	2130	4						2	1
740819	2200	4	2.9	0.07	0.01K	0.25	0.04		
740819	2230	4						3	1K
740819	2300	4	2.0	0.12	0.01K	0.25	0.04		
740819	2330	4						4	1
740819	2400	4	2.0	0.07	0.01K	0.20	0.03		
740820	0030	4						6	2
740820	0100	4	2.0	0.07	0.00K	0.25	0.03		
740820	0130	4						5	4
740820	0200	4	2.0	0.10	0.01K	0.22	0.03		
740820	0230	4						3	1
740820	0300	4	2.0	0.12	0.01K	0.25	0.03		
740820	0330	4						2	1K
740820	0400	4	2.5	0.10	0.01K	0.22	0.03		
740820	0430	4						2	1K
740820	0500	4	2.0	0.10	0.01K	0.30	0.03		
740820	0530	4						4	1
740820	0600	4	1.1	0.10	0.01K	0.25	0.05		
740820	0630	4						7	4
740820	0700	4	1.1	0.10	0.01K	0.22	0.03		
740820	0730	4						4	1
740820	0800	4	1.1	0.10	0.01K	0.22	0.02		
740820	0830	4						4	3
740820	0900	4	1.5	0.10	0.01K	0.25	0.02		
740820	0930	4						7	4
740820	1000	4	2.0	0.07	0.01K	0.22	0.02		
740820	1030	4						5	2
740820	1100	4	1.1	0.07	0.01K	0.22	0.02		
740820	1130	4						5	4
740820	1200	4	1.1	0.07	0.01K	0.24	0.02		
740820	1230	4						3	1K
740820	1300	4	2.5	0.07	0.01	0.25	0.02		
740820	1330	4						4	2
740820	1400	4	1.1	0.07	0.01	0.25	0.06		
740820	1500	4	1.1	0.07	0.01	0.25	0.02		
740819									
NUMBER			27	27	27	27	27	25	25
MAXIMUM			2.9	0.12	0.01	0.30	0.06	7	4
MINIMUM			1.1	0.07	0.00K	0.15	0.02	2	1K
MEAN			1.9	0.09	0.01	0.24	0.03	4	2
740820									

APPENDIX C-2.2

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST 1974

STATION - BPK-F BIG PINE KEY SPECIAL STATION LOWER FLORIDA FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740820 0250	4	2.5	0.12	0.01	0.50	0.04	2	2
740820 0825	4	2.0	0.13	0.01	0.28	0.04		
740820 1405	4	2.5	0.10	0.01	0.30	0.04	2	1K
740820								
NUMBER		3	3	3	3	3	2	2
MAXIMUM		2.5	0.13	0.01	0.50	0.04	2	2
MINIMUM		2.0	0.10	0.01	0.28	0.04	2	1K
MEAN		2.3	0.12	0.01	0.36	0.04	2	2
740820								

STATION - BPK-G BIG PINE KEY SPECIAL STATION LOWER FLORIDA FINGER FILL CANAL STUDY

DATE TIME	00003 DEPTH FEET	00680 T ORG C C MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L
740819 2230	5	2.9	0.10	0.01K	0.65	0.03	2	2
740820 0345	5	2.9	0.15	0.01K	0.30	0.04	1	1K
740820 0910	5	2.5	0.10	0.01	0.42	0.04		
740820 1455	5	2.0	0.10	0.01	0.25	0.04	5	2
740819								
NUMBER		4	4	4	4	4	3	3
MAXIMUM		2.9	0.15	0.01	0.65	0.04	5	2
MINIMUM		2.0	0.10	0.01K	0.25	0.03	1	1K
MEAN		2.6	0.11	0.01	0.40	0.04	3	2
740820								

APPENDIX C-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-15 50' FROM DEAD END OF CANAL VI SEA AIR ESTATES STUDY

DATE	TIME	DATE	TIME	00003 DEPTH FEET	00008 LAB IDENT. NUMBER	00400 PH SU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L
		740822	1900	8	3055	7.7	4.0	1	0.05	0.12	0.01	0.02	1.1
		740823	0715	8	3066	7.8	23.0	15	0.05	0.14	0.05	0.03	1.0K
		740823	1315	8	3067	7.8	12.0	8	0.07	0.15	0.05	0.03	1.0K
		740823	1820	7	3069	7.8	14.0	10	0.10	0.20	0.05	0.03	1.0K
740822													
NUMBER				4		4	4	4	4	4	4	4	4
MAXIMUM				8		7.8	23.0	15	0.10	0.20	0.05	0.03	1.1
MINIMUM				7		7.7	4.0	1	0.05	0.12	0.01	0.02	1.0K
MEAN				8		7.8,	13.3	9	0.07	0.15	0.04	0.03	1.0
740823													

APPENDIX C-2.3

```
                         ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                     SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                            FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - SA-16            50' FROM DEAD END OF CANAL VII  SEA AIR ESTATES STUDY
-------------------------------------------------------------------------------------------------------------------------
                                   00003    00008    00400    00530     00535     00610     00625     00630     00665      00680
                                   DEPTH     LAB      PH     RESIDUE   RESIDUE    NH3-N   TOT KJEL   NO2&NO3   PHOS-TOT   T ORG C
                                            IDENT.           TOT NFLT  VOL NFLT   TOTAL       N      N-TOTAL                C
DATE    TIME     DATE    TIME       FEET    NUMBER     SU      MG/L      MG/L      MG/L      MG/L      MG/L     MG/L P     MG/L

                 740822 1940         12      3056     7.6       6.0         4      0.05      0.15      0.05      0.02       1.0K
                 740823 0730         10      3070     7.6      25.0        15      0.05      0.12      0.07      0.03       1.1
                 740823 1330         10      3071     7.6      20.0        14      0.05      0.12      0.07      0.03       1.1
                 740823 1830         10      3073     7.6      21.0        16      0.12      0.20      0.07      0.03       1.5

740822
  NUMBER                              4                4         4         4         4         4         4         4          4
  MAXIMUM                            12              7.6      25.0        16      0.12      0.20      0.07      0.03       1.5
  MINIMUM                            10              7.6       6.0         4      0.05      0.12      0.05      0.02       1.0K
  MEAN                               11              7.6      18.0        12      0.07      0.15      0.06      0.03       1.2
740823
```

APPENDIX C-2.3

```
                              ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                          SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                                FINGER FILL CANAL STUDY  AUGUST, 1974

STATION - SA-17          400' FRM CLSED END OF BORROW PIT  SEA AIR ESTATES STUDY
------------------------------------------------------------------------------------------------------------------------------
                                 00003     00008     00400     00530     00535     00610     00625     00630     00665     00680
                                 DEPTH      LAB        PH     RESIDUE   RESIDUE    NH3-N   TOT KJEL   NO2&NO3  PHOS-TOT  T ORG C
                                           IDENT.             TOT NFLT  VOL NFLT   TOTAL      N      N-TOTAL               C
DATE   TIME    DATE   TIME        FEET     NUMBER      SU       MG/L      MG/L     MG/L      MG/L      MG/L     MG/L P    MG/L

               740822 2000          12       3057      7.5      11.0         8     0.07      0.32      0.01      0.03      1.0K
               740823 0735          12       3074      7.8      14.0        10     0.05      0.15      0.08      0.03      1.0K
               740823 1345          12       3075      7.7      36.0        26     0.05      0.10      0.06      0.03      1.0K
               740823 1845          12       3078      7.8       2.0         2               0.10      0.08      0.03      1.5

740822
   NUMBER                            4                  4         4         4        3         4         4         4         4
   MAXIMUM                          12                7.8      36.0        26     0.07      0.32      0.08      0.03      1.5
   MINIMUM                          12                7.5       2.0         2     0.05      0.10      0.01      0.03      1.0K
   MEAN                             12                7.7      15.8        12     0.06      0.17      0.06      0.03      1.1
740823
```

APPENDIX C-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-18 AT MOUTH OF BORROW PIT SEA AIR ESTATES STUDY

DATE	TIME	DATE	TIME	00003 DEPTH FEET	00008 LAB IDENT. NUMBER	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L
		740822	1700	5	2847			0.05	0.14	0.01	0.04	1.0K
		740822	1730	5	3058	12.0	8					
		740822	1800	5	2848			0.05	0.12	0.01	0.03	1.0
		740822	1830	5	3059	8.0	6					
		740822	1900	5	2849			0.05	0.10	0.01	0.03	2.0
		740822	1930	5	3060	13.0	9					
		740822	2000	5	2850			0.05	0.12	0.01	0.03	2.0
		740822	2030	5	3061	14.0	10					
		740822	2100	5	2851			0.07	0.25	0.01	0.03	1.1
		740822	2130	5	3062	13.0	10					
		740822	2200	5	2852			0.05	0.15	0.01	0.03	1.0
		740822	2230	5	3063	12.0	8					
		740822	2300	5	2853			0.05	0.12	0.01	0.03	1.0K
		740822	2330	5	3064	14.0	9					
		740822	2400	5	2868			0.06	0.10	0.18	0.03	1.0K
		740823	0030	5	3079	2.0	2					
		740823	0100	5	2869			0.05	0.10	0.08	0.03	1.0K
		740823	0130	5	3076	12.0	4					
		740823	0200	5	2870			0.05	0.12	0.06	0.03	1.0K
		740823	0230	5	3080	3.0	2					
		740823	0300	5	2871			0.05	0.25	0.06	0.03	1.0K
		740823	0330	5	3081	5.0	4					
		740823	0400	5	2872			0.06	0.10	0.07	0.03	1.0K
		740823	0430	5	3082	4.0	2					
		740823	0500	5	2873			0.04	0.12	0.08	0.03	1.0K
		740823	0530	5	3083	2.0	2					
		740823	0600	5	2882			0.05	0.12	0.08	0.03	1.0K
		740823	0630	5	3102	6.0	3					
		740823	0700	5	2874			0.05	0.12	0.07	0.03	1.0K
		740823	0730	5	3103	2.0	1K					
		740823	0800	5	2875			0.05	0.10	0.06	0.03	1.0K
		740823	0830	5	3084	3.0	1					
		740823	0900	5	2876			0.05	0.12	0.06	0.03	1.0K
		740823	0930	5	3085	2.0	2					
		740823	1000	5	2877			0.06	0.10	0.05	0.03	1.0K
		740823	1030	5	3086	4.0	3					
		740823	1100	5	2878			0.06	0.12	0.06	0.04	1.0K
		740823	1130	5	3087	1.0	1					
		740823	1200	5	2879			0.06	0.12	0.07	0.03	1.0K
		740823	1230	5	3088	3.0	3					
		740823	1300	5	2880			0.05	0.11	0.07	0.03	1.0K
		740823	1330	5	3089	2.0	2					
		740823	1400	5	2881			0.04	0.10	0.07	0.03	1.0K
		740823	1430	5	3090	1.0	1K					
		740823	1500	5	2883			0.04	0.12	0.08	0.03	1.0K
		740823	1530	5	3091	2.0	2					
		740823	1600	5	2884			0.05	0.12	0.09	0.03	1.0K
		740823	1630	5	3092	2.0	2					
		740823	1700	5	2885			0.04	0.10	0.09	0.03	1.0K
		740823	1730	5	3093	6.0	4					
		740823	1800	5	2886			0.04	0.10	0.09	0.03	1.0K
		740823	1830	5	3094	1.0	1					
		740823	1900	5	2888			0.05	0.11	0.09	0.03	1.0K
		740823	1930	5	3095	4.0	3					
		740823	2000	5	2889			0.04	0.32	0.08	0.03	1.0K
740822												
NUMBER				55		27	27	28	28	28	28	28
MAXIMUM				5		14.0	10	0.07	0.32	0.18	0.04	2.0
MINIMUM				5		1.0	1K	0.04	0.10	0.01	0.03	1.0K
MEAN				5		5.7	4	0.05	0.13	0.06	0.03	1.1
740823												

APPENDIX C-2.3

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY AUGUST, 1974

STATION - SA-19 BCKGRND 800'SEAWRD FRM PROJ SITE SEA AIR ESTATES STUDY

DATE	TIME	DATE	TIME	00003 DEPTH FEET	00008 LAB IDENT. NUMBER	00400 PH SU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L
		740822	2025	4	3065	7.7	10.0	6	0.17	0.20	0.01	0.03	1.0K
		740823	0740	4	3098	7.9	5.0	1	0.05	0.14	0.07	0.03	1.0K
		740823	1440	3	3100	8.0	2.0	1	0.08	0.12	0.06	0.03	1.0K
		740823	1900	3	3101	8.0	4.0	2	0.07	0.25	0.06	0.03	1.0K
740822													
NUMBER				4		4	4	4	4	4	4	4	4
MAXIMUM				4		8.0	10.0	6	0.17	0.25	0.07	0.03	1.0K
MINIMUM				3		7.7	2.0	1	0.05	0.12	0.01	0.03	1.0K
MEAN				4		7.9	5.3	3	0.09	0.18	0.05	0.03	1.0
740823													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-A WOODLAWN CANAL 50 FT FRM DEADEND

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0205	1		28.9	24.5	7.0	9.4	66	0.02	0.03	0.27	0.04	2500
740904	0206	2		29.3	25.1								
740904	0207	3		29.0	25.0								
740904	0645	1	1.6	28.4	24.4								
740904	0646	2		28.4	24.4								
740904	0647	3	2.5	28.3	24.4								
740904	0905	1		27.8	24.4								
740904	0905	2	2.7	27.9	24.4		8.5	9	0.03	0.02	0.37	0.04	3000
740904	0906	2	2.7	27.9	24.4								
740904	0907	3		28.0	24.2								
740904	1545	1	5.5	29.2	24.2								
740904	1546	2		29.6	23.9								
740904	1547	3	5.4	29.1	24.3								
740904	1548	4	4.7	29.0	24.2								
740904	1845	1	8.0	30.2	24.4								
740904	1846	2		29.6	24.5								
740904	1847	3	5.5	29.2	24.6								
740904	1848	4	5.2	29.0	24.9								
740904	2143	4		28.6	24.6								
740904	2144	5	4.5	28.6	24.5								
740904	2340	1	4.8	28.2	24.0								
740904	2340	3	4.4	28.8	24.2	7.6	8.0	42	0.01K	0.02	0.44	0.03	
740904	2341	2		28.7	24.2								
740904	2342	3	4.4	28.6	24.2								
740905	0300	1	4.2	28.1	24.2								
740905	0301	2		28.1	24.2								
740905	0302	3	3.5	28.2	24.2								
740905	0540	1	3.5	27.8	24.1								
740905	0541	2		27.7	24.2								
740905	0542	3	3.6	27.8	24.2								
740905	0820	1	3.2	27.7	24.2								
740905	0821	2	3.5	27.7	24.2								
740905	0822	3	3.1	27.7	24.3								
740905	1200	1	3.8	28.2	24.1								
740905	1200	2	4.2	28.2	24.3	6.9	8.0	47	0.01K	0.05	0.05K	0.03	761
740905	1201	2	4.2	28.2	24.3								
740905	1202	3	3.8	28.2	24.4								
740904													
NUMBER			25	37	37	3	4	4	4	4	4	4	3
MAXIMUM			8.0	30.2	25.1	7.6	9.4	66	0.03	0.05	0.46	0.04	3000
MINIMUM			1.6	27.7	23.9	6.9	8.0	9	0.01K	0.02	0.05K	0.03	761
MEAN			4.1	28.5	24.3	7.2	8.5	41	0.02	0.03	0.29	0.04	2087
740905													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-B WOODLAWN CANAL 900FT NR MID CANA

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0140	1		29.0	25.0	7.4	7.2	51	0.01	0.02	0.33	0.03	86
740904	0141	2		29.2	24.9								
740904	0142	3		29.3	25.0								
740904	0143	4		29.4	25.3								
740904	0640	1	2.0	28.4	25.0								
740904	0641	2		28.5	25.0								
740904	0642	3	2.0	28.5	25.0								
740904	0855	1	3.1	28.5	25.0		7.7	73	0.04	0.02	0.15	0.03	93
740904	0856	2		28.5	24.9								
740904	0857	3		28.5	25.0								
740904	0858	4	3.3	28.5	25.0								
740904	1540	1	6.2	30.0	24.3								
740904	1541	2		29.6	24.7								
740904	1542	3	6.3	29.3	24.7								
740904	1543	4		29.4	24.7								
740904	1544	5	5.9	29.1	24.3								
740904	1835	1	6.1	29.5	24.7								
740904	1836	2		29.8	24.7								
740904	1837	3	7.6	29.9	24.9								
740904	1838	4		29.2	24.9								
740904	1839	5	5.9	28.5	24.8								
740904	2330	1	5.5	28.4	24.7								
740904	2330	3	6.0	28.6	24.8	8.1	7.3	48	0.01K	0.01	0.55	0.03	86
740904	2331	2		28.5	24.7								
740904	2332	3	6.0	28.6	24.8								
740904	2333	4		28.5	24.7								
740904	2334	5	5.6	28.5	24.7								
740905	0300	1	4.0	28.1	24.7								
740905	0301	2		28.1	24.7								
740905	0302	3		28.2	24.7								
740905	0303	4	4.7	28.3	24.7								
740905	0530	1	4.3	27.5	24.1								
740905	0531	2	4.5	27.6	24.2								
740905	0532	3		27.6	24.3								
740905	0533	4	4.4	27.7	24.7								
740905	0815	1	4.3	27.5	24.6								
740905	0816	2	4.4	27.4	24.6								
740905	0817	3		27.3	24.4								
740905	0818	4	4.4	27.3	24.5								
740905	1145	1	4.7	27.6	24.2	7.1	7.4	43	0.04	0.04	0.90	0.03	125
740905	1146	2	4.9	27.5	24.4								
740905	1147	3		27.6	24.5								
740905	1148	4	4.6	27.7	24.6								
740904													
NUMBER			25	43	43	3	4	4	4	4	4	4	4
MAXIMUM			7.6	30.0	25.3	8.1	7.7	73	0.04	0.04	0.90	0.03	125
MINIMUM			2.0	27.3	24.1	7.1	7.2	43	0.01K	0.01	0.15	0.03	86
MEAN			4.8	28.5	24.7	7.5	7.4	54	0.03	0.02	0.48	0.03	98
740905													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-C WOODLAWN CANAL 1920 FT FRM MOUTH

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0130	1		28.9	25.1								
740904	0130	3		29.0	25.0	6.8	8.1		0.01K	0.01	0.31	0.02	57
740904	0131	2		29.0	25.0								
740904	0132	3		29.0	25.0								
740904	0133	4		29.1	26.2								
740904	0134	5		29.5	26.6								
740904	0630	1	3.2	28.5	25.2								
740904	0631	2		28.5	25.2								
740904	0632	3	4.6	28.3	25.2								
740904	0845	1	3.8	27.9	25.1								
740904	0846	2		28.1	24.9								
740904	0847	3		28.0	24.9								
740904	1530	1	8.3	29.6	24.0								
740904	1531	2		29.5	24.1								
740904	1532	3	7.6	29.3	24.2								
740904	1533	4	7.3	29.4	24.1								
740904	1825	1	7.5	28.8	24.9								
740904	1826	2		29.3	24.9								
740904	1827	3		29.0	24.9								
740904	1828	4	6.6	29.1	24.7								
740904	1829	5		29.2	24.9								
740904	1830	6	7.8	29.2	24.9								
740904	2240	1	4.9	27.8	24.4								
740904	2240	3	4.9	28.1	24.4	7.8	7.7		0.01K	0.01K	0.47	0.04	83
740904	2241	2		28.0	24.6								
740904	2242	3		28.1	24.4								
740904	2243	4	5.4	27.9	24.6								
740904	2244	5		28.2	24.7								
740904	2245	6	5.3	28.3	24.5								
740905	0240	1	6.1	28.0	24.6								
740905	0241	2		24.0	24.6								
740905	0242	3	6.3	28.0	24.6								
740905	0520	1	5.7	27.5	24.7								
740905	0521	2	5.7	27.5	24.7								
740905	0522	3	5.8	26.5	24.7								
740905	0805	1	5.0	27.5	24.1								
740905	0806	2	5.3	27.6	24.1								
740905	0807	3	5.3	27.4	24.6								
740905	1040						7.8		0.01K	0.01K	0.30		
740905	1135	1	5.5	26.9	24.4	7.4	7.4	60	0.01K	0.03	0.97	0.02	50
740905	1136	2	5.6	26.9	24.5								
740905	1137	3	5.7	27.3	24.5								
740905	1140						6.2	226		0.01		0.09	
740905	1240						7.6		0.01K	0.01	0.05K	0.11	
740905	1340						7.8		0.01K	0.02	0.18	0.07	
740905	1440						6.6	78	0.01K	0.01	0.05K	0.06	
740905	1540						8.6	94	0.01K	0.02	0.05K	0.08	

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-C WOODLAWN CANAL 1920 FT FRM MOUTH

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740905	1640						5.9	76	0.01K	0.01	0.05K	0.08	
740905	1740						8.8	102	0.02	0.02	0.05K	0.08	
740905	1840						6.4		0.01K	0.02	0.05K	0.09	
740905	1940						7.0		0.01K	0.01	0.05K	0.07	
740905	2040						7.2		0.01K	0.01K	0.05K	0.06	
740905	2140						6.0	70	0.01K	0.01K	0.44	0.03	
740905	2240						5.3	80	0.01K	0.01K	0.33	0.04	
740905	2340						7.8		0.01K	0.01K	0.05K	0.04	
740906	0040						8.4	92	0.01K	0.01K	0.42	0.04	
740906	0140						6.8		0.01K	0.01K	0.33	0.04	
740906	0240						8.2	102	0.01K	0.01K	0.05K	0.04	
740906	0340						9.7			0.01		0.03	
740906	0440						9.4	82	0.01K	0.01	0.63	0.09	
740906	0540						9.4	100	0.01K	0.01K	0.46	0.16	
740906	0640						10.4		0.01K	0.02	0.35	0.12	
740906	0740						10.7	82	0.01K	0.01	0.79	0.10	
740906	0840						7.4		0.01K	0.01K	0.75	0.11	
740904													
NUMBER			24	41	41	3	26	13	24	26	24	25	3
MAXIMUM			8.3	29.6	26.6	7.8	10.7	226	0.02	0.03	0.97	0.16	83
MINIMUM			3.2	26.5	24.0	6.8	5.3	60	0.01K	0.01K	0.05K	0.02	50
MEAN			5.8	28.3	24.8	7.3	7.8	96	0.01	0.01	0.30	0.07	63
740906													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-D WOODLAWN CANAL 1500FT FROM MOUTH

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
760904	0225	1	3.8	28.4	24.9	7.8	7.2	146	0.01K	0.01	0.30	0.01K	7K
760904	0226	5	3.8	28.4	24.9								
760904	0227	10	4.3	28.7	25.2								
760904	0228	13	3.6	28.5	25.4								
760904	0615	1	6.5	27.9	25.0								
760904	0616	2		28.2	25.0								
760904	0617	3	3.3	28.3	25.1								
760904	0618	4		28.2	25.1								
760904	0619	5		28.3	24.8								
760904	0620	6		28.0	25.1								
760904	0621	7	4.2	28.1	25.2								
760904	0825	1	6.8	28.0	24.9								
760904	0825	3	6.8	28.0	25.0		8.0	55	0.01K	0.01K	0.34	0.01	21
760904	0826	2		28.0	25.0								
760904	0827	3	5.4	28.2	25.0								
760904	0828	4		27.8	25.0								
760904	0829	5	5.9	27.9	25.4								
760904	1520	1	7.5	29.7	24.0								
760904	1521	2		29.1	24.1								
760904	1522	3	8.2	29.2	23.9								
760904	1523	4		28.3	24.0								
760904	1524	5	8.2	28.0	23.9								
760904	1815	1	8.3	28.8	24.5								
760904	1816	2	8.3	28.9	24.5								
760904	1817	3		29.0	24.5								
760904	1818	4		29.0	24.5								
760904	1819	5		29.1	24.5								
760904	1820	6	8.5	28.3	24.3								
760904	2224	1	7.0	28.2	24.2								
760904	2225	3	7.1	28.2	24.3	8.0	6.7	69	0.01K	0.01K	0.78	0.01	3
760904	2226	2		28.1	24.2								
760904	2227	3	7.1	28.2	24.3								
760904	2228	4		28.0	24.4								
760904	2229	5	6.9	28.1	24.4								
760905	0230	1	6.4	27.5	24.1								
760905	0231	2		27.5	24.2								
760905	0232	3	6.4	27.4	24.2								
760905	0233	4		27.4	24.2								
760905	0234	5		27.5	24.2								
760905	0235	6	6.1	27.5	24.6								
760905	0500	1	6.7	27.2	24.3								
760905	0501	2		27.2	24.3								
760905	0502	3	6.8	26.9	24.3								
760905	0503	4		27.0	24.2								
760905	0504	5		27.0	24.2								
760905	0505	6	6.8	26.7	24.2								
760905	0755	1	6.5	26.5	24.1								
760905	0756	2	6.1	26.5	24.1								
760905	0757	3		26.6	24.1								
760905	0758	4	6.0	26.7	24.1								
760905	1120	1	6.4	27.3	24.2	7.5	6.5	44	0.01K	0.02	0.57	0.01	5
760905	1121	2		27.3	24.2								
760905	1122	3	6.4	27.1	24.2								
760904													
NUMBER		53	32	53	53	3	4	4	4	4	4	4	4
MAXIMUM		13	8.5	29.7	25.4	8.0	8.0	146	0.01K	0.02	0.78	0.01	21
MINIMUM		1	3.3	26.5	23.9	7.5	6.5	44	0.01K	0.01K	0.30	0.01K	3K
MEAN		4	6.2	27.9	24.5	7.8	7.1	76	0.01	0.01	0.50	0.01	9
760905													

APPENDIX C-2.4

```
                    ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                 SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                    FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - PC-E            ST ANDREWS BAY MID-CHANNEL UF
------------------------------------------------------------------------------------------------------------------------------------------
                 00003      00300      00010      00480      00400      00680      00535      00610      00630      00625      00665      31501
                 DEPTH      DO         WATER      SALINITY   PH         T ORG C    RESIDUE    NH3-N      NO2&NO3    TOT KJEL   PHOS-TOT   TOT COLI
                                       TEMP                             C          VOL NFLT   TOTAL      N-TOTAL    N                     MFIMENDO
DATE   TIME      FEET       MG/L       CENT       PPTH       SU         MG/L       MG/L       MG/L       MG/L       MG/L       MG/L P     /100ML

740904 0300         1        5.9       28.6       24.8        6.7        6.3         50      0.01K      0.01K       0.28      0.01K         7K
740904 0301        10                  28.7       24.8
740904 0302        20                  29.6       31.3
740904 0303        24                  29.7       31.6
740904 0715         1        4.0       28.3       24.6
740904 0716        10        3.5       28.8       25.3
740904 0717        20                  30.0       32.5
740904 0718        25        2.0       29.9       32.5
740904 0930         1        4.9       28.2       24.3                   7.3                 0.01K      0.01K       0.18       0.01         7K
740904 0931        10        4.1       28.7       24.8
740904 0932        20                  30.1       32.3
740904 0933        25        3.0       30.1       32.3

740904
   NUMBER          12          7         12         12          1          2          1          2          2          2          2          2
   MAXIMUM         25        5.9       30.1       32.5                   7.3                 0.01K      0.01K       0.28       0.01         7K
   MINIMUM          1        2.0       28.2       24.3                   6.3                 0.01K      0.01K       0.18       0.01K        7K
   MEAN            14        3.9       29.2       28.4                   6.8                 0.01       0.01        0.23       0.01         7
740904
```

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-F PRETTY BAYOU BACKGROUND STATION

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0430	1	3.0	27.9	24.0	6.0	7.3	66	0.01K	0.01K	0.30	0.02	14
740904	0431	2	4.1	27.8	24.1								
740904	0432	3	3.7	27.7	24.1								
740904	0433	4	4.2	28.0	24.1								
740904	0434	5	2.7	27.8	24.0								
740904	0435	6	2.8	28.0	24.3								
740904	0436	7	3.9	28.3	24.8								
740904	0945	1	3.9	27.6	24.3								
740904	0945	3	3.9	27.6	24.3		7.9	57	0.01K	0.01K	0.44	0.03	7K
740904	0946	2		27.6	24.1								
740904	0947	3	4.0	27.6	24.2								
740904	0948	4		27.6	24.2								
740904	0949	5	3.5	27.7	24.3								
740904	1610	1		28.7	23.1								
740904	1611	2		28.9	23.0								
740904	1612	3	7.3	28.9	23.0								
740904	1613	4		28.8	23.3								
740904	1614	5		28.4	23.4								
740904	1905	1	8.3	28.2	23.2								
740904	1906	2		28.2	23.2								
740904	1907	3		28.3	23.3								
740904	1908	4	8.3	28.5	23.9								
740904	1909	5		29.1	24.2								
740904	1910	6		28.5	24.5								
740904	1911	7	7.3	28.7	24.5								
740905	0005	1	8.4	27.7	23.2								
740905	0005	3	[illegible]	27.5	23.0	7.5	7.3	67	0.01K	0.01K	0.42	0.02	3
740905	0006	2		27.3	23.2								
740905	0007	3		27.5	23.0								
740905	0008	4	8.2	27.5	23.2								
740905	0009	5		27.6	23.0								
740905	0010	6	7.6	27.8	23.4								
740905	0320	1	7.1	27.5	23.2								
740905	0321	2		27.2	23.2								
740905	0322	3		27.3	23.2								
740905	0323	4	7.0	27.4	23.3								
740905	0324	5		27.4	23.3								
740905	0325	6		27.9	23.6								
740905	0326	7	3.2	28.5	24.6								
740905	0600	1	6.1	27.0	23.3								
740905	0601	2		27.0	23.4								
740905	0602	3	6.3	27.0	23.4								
740905	0603	4		27.0	23.4								
740905	0604	5	6.2	27.2	23.4								
740905	0840	1	6.1	27.0	23.4								
740905	0841	2	6.1	27.1	23.6								
740905	0842	3		27.1	23.6								
740905	0843	4	6.0	27.3	23.6								
740905	1220	1	6.4	27.5	23.6								
740905	1220	2	6.0	27.5	23.6	7.5	7.3	49	0.01K	0.01K	0.44	0.03	20
740905	1221	2		27.5	23.6								
740905	1222	3	6.0	27.5	23.6								
740905	1223	4	6.1	27.5	23.6								
740904													
NUMBER		53	32	53	53	3	4	4	4	4	4	4	4
MAXIMUM		7	8.4	29.1	24.8	7.5	7.9	67	0.01K	0.01K	0.44	0.03	20
MINIMUM		1	2.7	27.0	23.0	6.0	7.3	49	0.01K	0.01K	0.30	0.02	3K
MEAN		3	5.7	27.8	23.6	7.0	7.4	60	0.01	0.01	0.40	0.03	11
740905													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-G HENTZ CANAL 50 FT FROM DEADEND

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0415	1	1.8	28.8	23.9	5.5	10.8	58	0.04	0.01	0.32	0.11	7
740904	1030	1	2.5	28.2	23.2		9.0	58	0.02	0.01	0.20	0.09	7K
740904	1031	2		28.5	23.2								
740904	1645	1	6.6	30.4	22.6								
740904	1646	2		30.4	22.9								
740904	1935	1	4.8	28.4	23.6								
740904	1936	2	5.0	29.3	23.8								
740905	0040	1	3.4	28.2	22.7								
740905	0040	2	3.3	28.2	22.7	6.9	9.7	53	0.01K	0.01	0.39	0.10	3K
740905	0041	2	3.3	28.2	22.7								
740905	0042	3	3.4	28.6	23.2								
740905	0345	1	2.9	27.8	21.9								
740905	0346	2	2.1	27.7	22.7								
740905	0625	1	2.2	28.2	22.2								
740905	0626	2	2.2	28.2	22.5								
740905	0910	1	2.5	27.7	23.7								
740905	1250	1	5.2	28.0	22.7	6.9	11.3	50	0.01K	0.01	0.40	0.12	10
740905	1300	1		27.9	22.5								
740904													
NUMBER			15	18	18	3	4	4	4	4	4	4	4
MAXIMUM			6.6	30.4	23.9	6.9	11.3	58	0.04	0.01	0.40	0.12	10
MINIMUM			1.8	27.7	21.9	5.5	9.0	50	0.01K	0.01	0.20	0.09	3K
MEAN			3.4	28.5	22.9	6.4	10.2	55	0.02	0.01	0.33	0.11	7
740905													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-H HENTZ CANAL 1500 FT NR MID CANAL

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0355	1	1.9	28.0	23.5	5.8	11.0	165	0.01	0.01	0.36	0.09	7K
740904	0356	2	4.1	29.3	24.1								
740904	0357	3	1.9	29.5	25.2								
740904	1015	1		28.2	23.4								
740904	1015	2	4.2	28.2	23.3		10.1	51	0.01K	0.01	0.21	0.08	21
740904	1016	2	4.2	28.2	23.3								
740904	1017	3		28.4	23.8								
740904	1625	1	6.2	30.2	23.5								
740904	1626	2		30.0	23.2								
740904	1627	3	6.1	29.6	23.3								
740904	1628	4	5.0	29.4	23.3								
740904	1925	1	5.7	29.3	23.1								
740904	1926	2		29.4	23.7								
740904	1927	3	5.8	29.4	24.1								
740904	1928	4	6.0	29.4	23.8								
740905	0025	1	5.7	28.4	22.7								
740905	0025	3	5.0	29.0	23.4	7.0	8.2		0.01K	0.02	0.23	0.05	15
740905	0026	2		28.4	22.8								
740905	0027	3	5.0	29.0	23.4								
740905	0028	4	5.2	29.0	23.6								
740905	0340	1	4.3	28.1	22.8								
740905	0341	2		28.5	22.8								
740905	0342	3	4.0	28.7	23.5								
740905	0615	1	4.0	27.7	22.6								
740905	0616	2		27.9	22.9								
740905	0617	3	3.9	28.1	23.1								
740905	0900	1	3.6	27.7	22.9								
740905	0901	2	3.4	27.7	22.9								
740905	0902	3	3.5	27.7	22.9								
740905	1250	1	5.2	28.0	22.7								
740905	1251	2	3.8	28.0	22.9								
740905	1252	3	5.3	27.8	23.0								
740905	1300	1		27.9	22.5	6.8	8.7	58	0.01K	0.01K	0.23	0.07	20
740904													
NUMBER			25	33	33	3	4	3	4	4	4	4	4
MAXIMUM			6.2	30.2	25.2	7.0	11.0	165	0.01	0.02	0.36	0.09	21
MINIMUM			1.9	27.7	22.5	5.8	8.2	51	0.01K	0.01K	0.21	0.05	7K
MEAN			4.5	28.6	23.3	6.5	9.5	91	0.01	0.01	0.26	0.07	16
740905													

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

Reproduced from best available copy.

STATION - PC-I   MENTZ CANAL 3000 FT FROM MOUTH

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740904	0330	1	3.0	28.4	24.5	6.5	8.7		0.01	0.01K	0.84	0.06	7K
740904	0331	2	3.5	28.5	24.6								
740904	0332	3	3.0	28.4	24.5								
740904	0333	4	3.2	28.4	24.5								
740904	1000	1		27.6	23.8								
740904	1001	2	4.2	27.6	24.0								
740904	1002	3		27.8	24.2								
740904	1003	4		27.7	24.3								
740904	1615	1		29.4	23.4								
740904	1616	2		29.5	23.7								
740904	1617	3	6.8	29.6	23.7								
740904	1618	4		29.3	23.9								
740904	1619	5	6.7	28.7	23.6								
740904	1915	1	6.6	29.3	24.1								
740904	1916	2		29.1	24.0								
740904	1917	3	6.7	29.8	24.1								
740904	1918	4		29.5	24.0								
740904	1919	5	6.7	29.2	23.9								
740905	0015	1	6.0	27.9	23.2								
740905	0015	3	7.3	28.4	23.5	7.6	9.0		0.01K	0.02	0.05K	0.06	8
740905	0016	2		28.3	23.5								
740905	0017	3	7.3	28.4	23.5								
740905	0018	4		28.6	23.4								
740905	0019	5	7.8	28.2	23.6								
740905	0330	1	4.7	28.0	23.4								
740905	0331	2		28.0	23.2								
740905	0332	3	4.9	28.0	23.4								
740905	0333	4		28.0	23.4								
740905	0334	5	5.1	28.1	23.4								
740905	0610	1	4.4	27.6	23.2								
740905	0611	2		27.6	23.4								
740905	0612	3	4.4	27.7	23.4								
740905	0613	4		27.7	23.4								
740905	0614	5	4.5	27.6	23.4								
740905	0815	1	2.7	27.5	23.2								
740905	0816	2		27.5	23.2								
740905	0817	3	4.0	27.5	23.2								
740905	0818	4		27.5	23.2								
740905	0819	5	4.2	27.5	23.2								
740905	1100						9.2		0.01K	0.02	0.05K		
740905	1204						14.0		0.01K	0.03	0.29	0.09	
740905	1235	1	5.0	27.8	23.2	7.1	9.4	168	0.01K	0.01K	0.21	0.08	5
740905	1236	2		27.7	23.2								
740905	1237	3	4.9	27.6	23.3								
740905	1238	4	4.3	27.5	23.4								
740905	1308						12.2	80	0.01K	0.02	0.26	0.18	
740905	1412						17.3		0.01	0.02	0.40	0.19	

APPENDIX C-2.4

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - PC-1 HENTZ CANAL 3000 FT FROM MOUTH

DATE	TIME	00003 DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00480 SALINITY PPTH	00400 PH SU	00680 T ORG C C MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31501 TOT COLI MFIMENDO /100ML
740905	1516						12.4		0.01	0.03	0.42	0.13	
740905	1620						11.3		0.06	0.03	0.30	0.10	
740905	1724						13.0		0.07	0.03	0.29	0.15	
740905	1828						12.6	98	0.05	0.03	0.24	0.17	
740905	1932						11.5			0.01		0.19	
740905	2036						19.4	100	0.10	0.01	0.43	0.23	
740905	2140						16.9		0.01K	0.01	0.42	0.30	
740905	2244						18.3		0.09	0.02	0.57		
740905	2348						18.8	308	0.23	0.01	0.46	0.24	
740906	0052						12.8		0.01K	0.01	0.47	0.19	
740906	0156						21.4		0.01K	0.01K	0.38	0.21	
740906	0300						11.7		0.01K	0.01	0.35	0.13	
740906	0404						13.8	146	0.01K	0.02	0.43	0.13	
740906	0508						11.1		0.01	0.02	0.36	0.11	
740906	0612						10.9		0.01K	0.02	0.31	0.10	
740906	0716						12.2		0.01K	0.02	0.36	0.11	
740904													
NUMBER			26	43	43	3	23	6	22	23	22	21	3
MAXIMUM			7.8	29.8	24.6	7.6	21.4	308	0.23	0.03	0.84	0.30	8
MINIMUM			2.7	27.5	23.2	6.5	8.7	80	0.01K	0.01K	0.05K	0.06	5K
MEAN			5.1	28.2	23.6	7.1	13.4	150	0.03	0.02	0.36	0.15	7
740906													

APPENDIX C-2.5

Reproduced from best available copy.

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-01 ATLANTIC BCH-NEAR CANAL DEAD END

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917	0010	3.2	10.0	2	0.05	0.01K	0.25	0.04		
740917	1830	3.4	9.0	3	0.03	0.01K	0.27	0.04		
740917	1845	6.1	10.0	3	0.07	0.01K	0.40	0.05		
740917	2345	6.1	7.0	2	0.10	0.01K	0.30	0.04		
740918	0440	2.5			0.14	0.01K	0.32	0.05	1500	3400
740918	0930	2.2	12.0	9	0.07	0.01K	0.30	0.09		
740918	1200								170	
740918	1400	2.5	2.0	1	0.07	0.01K	0.20	0.09		
740918	1745	2.5	3.0	2	0.07	0.01K	0.30	0.06		
740917										
NUMBER		8	7	7	8	8	8	8	2	1
MAXIMUM		6.1	12.0	9	0.14	0.01K	0.40	0.09	1500	
MINIMUM		2.2	2.0	1	0.03	0.01K	0.20	0.04	170	
MEAN		3.6	7.6	3	0.07	0.01	0.29	0.06	835	
740918										

STATION - AB-02 ATLANTIC BCH-W OF MOREHEAD AVE

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740918	0445	5.2	4.0	4	0.07	0.01K	0.20	0.05	230	400
740918	0950	5.2	12.0	6	0.07	0.01K	0.32	0.06		
740918	1205								56	
740918	1345	5.0	9.0	5	0.07	0.01K	0.28	0.05		
740918	1800	5.7	15.0	8	0.16	0.01	0.32	0.06		
740918										
NUMBER		4	4	4	4	4	4	4	2	1
MAXIMUM		5.7	15.0	8	0.16	0.01	0.32	0.06	230	
MINIMUM		5.0	4.0	4	0.07	0.01K	0.20	0.05	56	
MEAN		5.3	10.0	6	0.09	0.01	0.28	0.05	143	
740918										

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-03 ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917	1700	4.2	30.0	7	0.05	0.01K	0.27	0.04		
740917	1800	4.2			0.05	0.01K	0.30	0.05		
740917	1830		19.0	4						
740917	1900	3.2			0.05	0.01K	0.20	0.04		
740917	1930		28.0	15						
740917	2000	2.8			0.03	0.01K	0.17	0.04		
740917	2030		17.0	4						
740917	2100	2.5			0.03	0.01K	0.20	0.03		
740917	2130		18.0	4						
740917	2200	2.5			0.10	0.01K	0.20	0.03		
740917	2230		42.0	10						
740917	2300	2.5			0.10	0.01K	0.17	0.03		
740917	2330		34.0	6						
740917	2400	2.8			0.10	0.01K	0.17	0.03		
740918	0030		3.0	3						
740918	0100	3.1			0.07	0.01K	0.20	0.03		
740918	0130		13.0	7						
740918	0200	3.0			0.08	0.01K	0.20	0.03		
740918	0230		11.0	5						
740918	0300	3.0			0.07	0.01K	0.32	0.04		
740918	0330		32.0	12						
740918	0400	3.0			0.07	0.01K	0.26	0.04		
740918	0430		15.0	9						
740918	0500	3.0			0.07	0.01K	0.30	0.05	170	360
740918	0530		11.0	8						
740918	0600	4.8			0.10	0.01K	0.32	0.05		
740918	0630		15.0	5						
740918	0700	4.5			0.14	0.01K	0.32	0.06		
740918	0730		12.0	5						
740918	0800	3.5			0.07	0.01K	0.30	0.04		
740918	0830		8.0	3						
740918	0900	3.7			0.08	0.01K	0.26	0.04		
740918	0930		14.0	4						
740918	1000	4.8			0.37	0.01K	0.80	0.04		
740918	1030		17.0	10						
740918	1100	3.7			0.16	0.01K	0.20	0.04		
740918	1130		15.0	7						
740918	1200	3.7			0.07	0.01K	0.20	0.04		
740918	1210									
740918	1230		7.0	5					48	
740918	1300	4.2			0.10	0.01K	0.20	0.04		
740918	1330		5.0	4						
740918	1400	3.7			0.10	0.01K	0.22	0.04		
740918	1430		19.0	8						
740918	1500	3.7			0.10	0.01K	0.20	0.04		
740918	1530		17.0	8						
740918	1600	4.0			0.10	0.01K	0.24	0.05		
740918	1630		9.0	5						
740918	1700	3.7			0.10	0.01K	0.24	0.04		
740918	1730		10.0	8						
740918	1800	4.0			0.06	0.01K	0.26	0.04		
740918	1830		10.0	7						
740918	1900	9.0			0.05	0.01K	0.32	0.05		
740918	1930		14.0	8						
740918	2000	9.0			0.10	0.01K	0.26	0.04		
740917										
NUMBER		28	27	27	28	28	28	28	2	1
MAXIMUM		9.0	42.0	15	0.37	0.01K	0.80	0.06	170	
MINIMUM		2.5	3.0	3	0.03	0.01K	0.17	0.03	48	
MEAN		3.9	16.5	7	0.09	0.01	0.26	0.04	109	
740918										

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-04 ATLANTIC BCH-NR CANAL DEAD END

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917	1730	3.2	16.0	5	0.05	0.01K	0.17	0.03		
740918	0040	5.0	9.0	8	0.10	0.01K	0.28	0.04		
740918	0510	3.7	10.0	7	0.10	0.01K	0.32	0.06	84	106
740918	1015	3.1	14.0	4	0.10	0.01K	0.38	0.08		
740918	1220								4K	6K
740918	1245	4.8	27.0	6	0.10	0.01K	0.38	0.06		
740918	1815	4.0	39.0	11	0.05	0.01K	0.32	0.05		
740917										
NUMBER		6	6	6	6	6	6	6	2	2
MAXIMUM		5.0	39.0	11	0.10	0.01K	0.38	0.08	84	106
MINIMUM		3.1	9.0	4	0.05	0.01K	0.17	0.03	4K	6K
MEAN		4.0	19.2	7	0.08	0.01	0.31	0.05	44	56
740918										

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-05 ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917	1730		25.0	6						
740917	1800	2.5			0.10	0.01K	0.25	0.03		
740917	1830		13.0	4						
740917	1900	2.5			0.10	0.01K	0.18	0.03		
740917	1930		12.0	4						
740917	2000	2.5			0.12	0.10	0.25	0.03		
740917	2030		33.0	8						
740917	2100	2.2			0.10	0.01K	0.20	0.03		
740917	2130		27.0	11						
740917	2200	2.2			0.10	0.01K	0.17	0.04		
740917	2230		17.0	9						
740917	2300	2.1			0.10	0.01K	0.15	0.04		
740917	2330		16.0	6						
740917	2400	3.1			0.05	0.01K	0.26	0.05		
740918	0030		14.0	3						
740918	0100	2.5			0.05	0.01K	0.26	0.05		
740918	0130		10.0	5						
740918	0200	3.5			0.05	0.01K	0.26	0.05		
740918	0230		23.0	7						
740918	0300	2.1			0.05	0.01K	0.30	0.05		
740918	0330		12.0	6						
740918	0400	2.1			0.05	0.01K	0.30	0.05		
740918	0430		12.0	5						
740918	0500	2.1			0.05	0.01K	0.32	0.08		
740918	0520									
740918	0530		14.0	4					48	120
740918	0600	2.1			0.10	0.01K	0.38	0.08		
740918	0630		13.0	8						
740918	0700	1.0			0.07	0.01K	0.26	0.05		
740918	0730		10.0	5						
740918	0800	3.0			0.16	0.01K	0.24	0.05		
740918	0830		16.0	8						
740918	0900	1.0			0.10	0.01K	0.24	0.05		
740918	0930		19.0	7						
740918	1000	3.5			0.10	0.01K	0.26	0.06		
740918	1030		17.0	8						
740918	1100	1.0			0.10	0.01K	0.19	0.05		
740918	1130		7.0	5						
740918	1200	3.0			0.07	0.01K	0.24	0.05		
740918	1225									
740918	1230		11.0	4					4K	6
740918	1300	2.1			0.10	0.01K	0.26	0.05		
740918	1330		5.0	3						
740918	1400	3.0			0.10	0.01K	0.26	0.06		
740918	1430		2.0	2						
740918	1500	1.0			0.10	0.01K	0.30	0.21		
740918	1530		11.0	7						
740918	1600	3.0			0.10	0.01K	0.26	1.46		
740918	1630		10.0	5						
740918	1700	3.2			0.10	0.01K	0.26	0.22		
740918	1730		3.0	2						
740918	1800	2.8			0.10	0.01K	0.30	0.05		
740918	1830		15.0	5						
740918	1900	3.0			0.10	0.01K	0.11	0.06		
740918	1930		20.0	6						
740918	2000	3.2			0.10	0.01K	0.26	0.05		
740917										
NUMBER		27	27	27	27	27	27	27		
MAXIMUM		3.5	33.0	11	0.16	0.10	0.38	1.46	2	2
MINIMUM		1.0	2.0	2	0.05	0.01K	0.11	0.03	48	120
MEAN		2.5	14.6	6	0.09	0.01	0.25	0.11	4K	6
740918									26	63

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-06 ATLANTIC BCH-W OF MOREHEAD AVE

DATE TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917 1810	2.2	21.0	8	0.03	0.01K	0.12	0.03		
740918 0105	2.1	36.0	8	0.10	0.01K	0.15	0.05		
740918 0535	1.8	39.0	11	0.07	0.01K	0.24	0.05		
740918 1105	2.6	23.0	7	0.10	0.01K	0.20	0.05		
740918 1230								4K	10
740918 1320	2.6	22.0	7	0.10	0.01K	0.20	0.05		
740918 1840	2.6	25.0	5	0.10	0.01K	0.24	0.05		
740917									
NUMBER	6	6	6	6	6	6	6	1	1
MAXIMUM	2.6	39.0	11	0.10	0.01K	0.24	0.05		
MINIMUM	1.8	21.0	5	0.03	0.01K	0.12	0.03		
MEAN	2.3	27.7	8	0.08	0.01	0.19	0.05		
740918									

STATION - AB-07 ATLANTIC BCH-W OF MOREHEAD AVE

DATE TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740917 1800	2.1	36.0	11	0.03	0.01K	0.10	0.03		
740918 0125	1.0	23.0	3	0.10	0.01K	0.20	0.05		
740918 0530	2.5	32.0	8	0.10	0.01K	0.26	0.05	4K	4K
740918 1055	1.2	25.0	4	0.10	0.01K	0.30	0.05		
740918 1235								4K	4K
740918 1310	1.2	32.0	6	0.10	0.01K	0.18	0.05		
740918 1835	2.3	28.0	4	0.10	0.01K	0.24	0.05		
740917									
NUMBER	6	6	6	6	6	6	6	2	2
MAXIMUM	2.5	36.0	11	0.10	0.01K	0.30	0.05	4K	4K
MINIMUM	1.0	23.0	3	0.03	0.01K	0.10	0.03	4K	4K
MEAN	1.7	29.3	6	0.09	0.01	0.21	0.05	4	4
740918									

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-08 ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P
740919	1130	5.6	38.0	8	0.10	0.01K	0.15	0.05
740919	1710	2.6	22.0	1K	0.10	0.01K	0.20	0.05
740919	2350	4.1	27.0	6	0.10	0.01K	0.15	0.05
740920	0605	1.4	12.0	2	0.10	0.01K	0.18	0.06
740920	1240	2.0	30.0	8	0.10	0.01K	0.18	0.05
740919								
NUMBER		5	5	5	5	5	5	5
MAXIMUM		5.6	38.0	8	0.10	0.01K	0.20	0.06
MINIMUM		1.4	12.0	1K	0.10	0.01K	0.15	0.05
MEAN		3.1	25.8	5	0.10	0.01	0.17	0.05
740920								

STATION - AB-09 ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P
740919	1130	2.6	23.0	6	0.14	0.01K	0.24	0.05
740919	1650	4.0	34.0	9	0.10	0.01K	0.24	0.08
740920	0010	2.3	23.0	2	0.10	0.01K	0.26	0.06
740920	0630	2.6	33.0	6	0.10	0.01K	0.26	0.08
740920	1215	2.0	34.0	6	0.14	0.02	0.20	0.08
740919								
NUMBER		5	5	5	5	5	5	5
MAXIMUM		4.0	34.0	9	0.14	0.02	0.26	0.08
MINIMUM		2.0	23.0	2	0.10	0.01K	0.20	0.05
MEAN		2.7	29.4	6	0.12	0.01	0.24	0.07
740920								

APPENDIX C-2.5

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - AB-10 ATLANTIC BCH-N OF FT MACON BLVD

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P
740919	1200	4.0			0.10	0.01K	0.18	0.05
740919	1230		8.0	2				
740919	1300	2.0			0.10	0.01K	0.20	0.05
740919	1330		23.0	8				
740919	1400	2.0			0.10	0.01K	0.20	0.06
740919	1430		19.0	6				
740919	1500	2.0			0.10	0.01K	0.24	0.08
740919	1530		26.0	9				
740919	1600	2.6			0.10	0.01K	0.20	0.09
740919	1630		17.0	1K				
740919	1700	4.1			0.10	0.01K	0.24	0.09
740919	1730		34.0	1				
740919	1800	3.1			0.10	0.01K	0.20	0.08
740919	1830		18.0	1K				
740919	1900	3.1			0.10	0.01K	0.18	0.08
740919	1930		20.0	1K				
740919	2000	5.5			0.10	0.01K	0.24	0.05
740919	2030		16.0	2				
740919	2100	3.1			0.10	0.01K	0.20	0.05
740919	2130		12.0	0				
740919	2200	2.0			0.10	0.01K	0.20	0.05
740919	2230		13.0	1K				
740919	2300	2.3			0.10	0.01K	0.15	0.06
740919	2330		14.0	2				
740919	2400	2.6			0.10	0.01K	0.24	0.08
740920	0030		23.0	8				
740920	0100	1.6			0.03	0.01K	0.20	0.05
740920	0130		11.0	1K				
740920	0200	1.8			0.03	0.01K	0.18	0.05
740920	0230		16.0	3				
740920	0300	4.9			0.10	0.01K	0.20	0.06
740920	0330		40.0	10				
740920	0400	2.6			0.10	0.01K	0.24	0.08
740920	0430		29.0	2				
740920	0500	2.6			0.10	0.01K	0.20	0.06
740920	0530		57.0	12				
740920	0600	2.6			0.10	0.01K	0.26	0.08
740920	0630		36.0	11				
740920	0700	2.6			0.10	0.01K	0.26	0.08
740920	0730		34.0	3				
740920	0800	2.6			0.10	0.01K	0.30	0.08
740920	0830		24.0	13				
740920	0900	2.4			0.03	0.01K	0.20	0.05
740920	0930		22.0	11				
740920	1000	1.6			0.03	0.01K	0.18	0.05
740920	1030		19.0	11				
740920	1100	1.6			0.03	0.01K	0.18	0.05
740920	1130		15.0	11				
740920	1200	1.8			0.03	0.01K	0.20	0.05
740920	1230		28.0	14				
740919								
NUMBER		25	25	25	25	25	25	25
MAXIMUM		5.5	57.0	14	0.10	0.01K	0.30	0.09
MINIMUM		1.6	8.0	0K	0.03	0.01K	0.15	0.05
MEAN		2.7	23.0	6	0.08	0.01	0.21	0.06
740920								

APPENDIX C-2.6

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - SC-01 SPOONER CR-S OF N.C. HWY 24

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P
740918	1200	2.5	12.0	9	0.07	0.01K	0.16	0.03
740923	2030	4.2	23.0	11	0.10	0.01K	0.24	0.06
740924	0225	2.6	21.0	12	0.03	0.01K	0.30	0.08
740924	0945	2.6	23.0	14	0.10	0.01K	0.32	0.08
740924	1500	2.6	45.0	20	0.07	0.01K	0.42	0.10
740918								
NUMBER		5	5	5	5	5	5	5
MAXIMUM		4.2	45.0	20	0.10	0.01K	0.42	0.10
MINIMUM		2.5	12.0	9	0.03	0.01K	0.16	0.03
MEAN		2.9	24.8	13	0.07	0.01	0.29	0.07
740924								

STATION - SC-02 SPOONER CR-S OF N.C. HWY 24

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P
740918	1210		6.0	5				
740923	2120	4.0	21.0	10	0.03	0.01K	0.20	0.05
740924	0230	2.6	24.0	17	0.10	0.01K	0.26	0.08
740924	0905	3.7	18.0	9	0.10	0.01K	0.24	0.08
740924	1515	3.3	56.0	22	0.03	0.01K	0.23	0.08
740918								
NUMBER		4	5	5	4	4	4	4
MAXIMUM		4.0	56.0	22	0.10	0.01K	0.26	0.08
MINIMUM		2.6	6.0	5	0.03	0.01K	0.20	0.05
MEAN		3.4	25.0	13	0.06	0.01	0.23	0.07
740924								

APPENDIX C-2.6

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

STATION - SC-03 SPOONER CR-E OF HARBOR DRIVE

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML
740918	1220	3.7	6.0	3	0.10	0.01K	0.30	0.04	145
740923	2145	3.4	43.0	17	0.10	0.01K	0.26	0.08	
740924	0245	3.3	35.0	12	0.10	0.01K	0.34	0.06	
740924	0915	2.2	12.0	6	0.03	0.01K	0.24	0.05	
740924	1355	2.6	18.0	8	0.10	0.01K	0.42	0.08	
740918									
NUMBER		5	5	5	5	5	5	5	1
MAXIMUM		3.7	43.0	17	0.10	0.01K	0.42	0.08	
MINIMUM		2.2	6.0	3	0.03	0.01K	0.24	0.04	
MEAN		3.0	22.8	9	0.09	0.01	0.31	0.06	
740924									

STATION - SC-04 SPOONER CR-E OF HARBOR DRIVE

DATE	TIME	00680 T ORG C C MG/L	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	00610 NH3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	31616 FEC COLI MFM-FCBR /100ML	31501 TOT COLI MFIMENDO /100ML
740918	1200								12	22
740923	2150	2.6	40.0	21	0.03	0.01K	0.24	0.06		
740924	0255	2.2	11.0	5	0.03	0.01K	0.20	0.05		
740924	0935	2.6	32.0	9	0.07	0.01K	0.18	0.05		
740924	1410	2.6	40.0	17	0.03	0.01K	0.18	0.05		
740918										
NUMBER		4	4	4	4	4	4	4	1	1
MAXIMUM		2.6	40.0	21	0.07	0.01K	0.24	0.06		
MINIMUM		2.2	11.0	5	0.03	0.01K	0.18	0.05		
MEAN		2.5	30.8	13	0.04	0.01	0.20	0.05		
740924										

APPENDIX C-2.6

```
                    ENVIRONMENTAL PROTECTION AGENCY  REGION IV
                  SURVEILLANCE AND ANALYSIS DIVISION  ATHENS, GEORGIA
                      FINGER FILL CANAL STUDY  SEPTEMBER, 1974

STATION - SC-05            SPOONER CR-NR INTRACOSTL WATRWAY
--------------------------------------------------------------------------------------------
                   00680      00530      00535      00610      00630      00625      00665
                 T ORG C    RESIDUE    RESIDUE     NH3-N    NO2&NO3   TOT KJEL   PHOS-TOT
                    C       TOT NFLT   VOL NFLT    TOTAL    N-TOTAL      N
DATE    TIME      MG/L       MG/L       MG/L       MG/L       MG/L       MG/L      MG/L P

740923 2200        2.6       24.0         11       0.03      0.01K      0.15       0.06
740924 0310        2.2       12.0          7       0.03      0.01K      0.18       0.05
740924 0945        1.8       23.0         10       0.03      0.01K      0.18       0.05
740924 1615        1.9       25.0         10       0.03      0.01K      0.15       0.05

740923
    NUMBER           4          4          4          4          4          4          4
    MAXIMUM        2.6       25.0         11       0.03      0.01K      0.18       0.06
    MINIMUM        1.8       12.0          7       0.03      0.01K      0.15       0.05
    MEAN           2.1       21.0         10       0.03      0.01       0.16       0.05
740924



STATION - SC-06            SPOONER CR-E OF HARBOR DRIVE
----------------------------------
                  31616      31501
                 FEC COLI   TOT COLI
                 MFM-FCHR   MFIMENDO
DATE    TIME      /100ML     /100ML

740918 1210          10         76

740918
    NUMBER            1          1
    MAXIMUM
    MINIMUM
    MEAN
740918
```

APPENDIX C-2.7

ENVIRONMENTAL PROTECTION AGENCY REGION IV
SURVEILLANCE AND ANALYSIS DIVISION ATHENS, GEORGIA
FINGER FILL CANAL STUDY SEPTEMBER, 1974

```
STATION - EI-01             EMERALD ISLE-N OF N.C. HWY 58
----------------------------------------------------------------------------------------------------------------------
                  00680      00530      00535      00610      00630      00625      00665      31616      31501
                 T ORG C    RESIDUE    RESIDUE    NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   FEC COLI   TOT COLI
                    C       TOT NFLT   VOL NFLT   TOTAL     N-TOTAL       N                  MFM-FCBR   MFIMENDO
DATE    TIME      MG/L       MG/L       MG/L       MG/L       MG/L       MG/L      MG/L P     /100ML     /100ML

740918 1100        2.4       72.0         70       7.20      0.01K       7.65       1.82       400        550
740923 1140        3.3      270.0        220       8.00      0.01K       8.30       2.40

740918
    NUMBER           2          2          2          2          2          2          2         1          1
    MAXIMUM        3.3      270.0        220       8.00      0.01K       8.30       2.40
    MINIMUM        2.4       72.0         70       7.20      0.01K       7.65       1.82
    MEAN           2.8      171.0        145       7.60       0.01       7.97       2.11
740923


STATION - EI-02             EMERALD ISLE-N OF N.C. HWY 58
----------------------------------------------------------------------------------------------------------------------
                  00680      00530      00535      00610      00630      00625      00665      31616      31501
                 T ORG C    RESIDUE    RESIDUE    NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   FEC COLI   TOT COLI
                    C       TOT NFLT   VOL NFLT   TOTAL     N-TOTAL       N                  MFM-FCBR   MFIMENDO
DATE    TIME      MG/L       MG/L       MG/L       MG/L       MG/L       MG/L      MG/L P     /100ML     /100ML

740918 1110                  30.0         27                                                   610       5600
740923 1145        3.6      495.0        320       2.40      0.01K       5.26       2.80

740918
    NUMBER           1          2          2          1          1          1          1         1          1
    MAXIMUM                 495.0        320
    MINIMUM                  30.0         27
    MEAN                    262.5        174
740923


STATION - EI-03             EMERALD ISLE-N OF N.C. HWY 58
----------------------------------------------------------------------------------------------------------------------
                  00680      00530      00535      00610      00630      00625      00665      31616      31501
                 T ORG C    RESIDUE    RESIDUE    NH3-N     NO2&NO3    TOT KJEL   PHOS-TOT   FEC COLI   TOT COLI
                    C       TOT NFLT   VOL NFLT   TOTAL     N-TOTAL       N                  MFM-FCBR   MFIMENDO
DATE    TIME      MG/L       MG/L       MG/L       MG/L       MG/L       MG/L      MG/L P     /100ML     /100ML

740918 1125       14.5        8.0          8       0.52      0.01K       0.93       0.79       220       1000
740923 1130       12.5       11.0          8       0.03      0.01K       0.44       0.83

740918
    NUMBER           2          2          2          2          2          2          2         1          1
    MAXIMUM       14.5       11.0          8       0.52      0.01K       0.93       0.83
    MINIMUM       12.5        8.0          8       0.03      0.01K       0.44       0.79
    MEAN          13.5        9.5          8       0.27       0.01       0.68       0.81
740923
```

APPENDIX D-1.1

Organic matter content of bottom cores, finger canals I and II, Punta Gorda, Florida, November 1973.

Canal I			Canal II			Control		
Sta†	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
1-R	0-7	200	5-R	0-2	220	4-R	0-1	150
	7-30	160		2-9	150		1-7	20
	30-34	150		9-17	100		7-26	10
	34-37	40		17-24	110		26-29	30
1-M	0-12	320	5-M	0-4	230	4-M	0-1	
	12-41	190		4-15	220		1-7	20
	41-44	90		15-50	170		7-27	10
				50-100	180		27-28	30
1-L	0-4	240		100-113	210		28-44	20
	4-7	200		113-121	230			
	7-18	240				4-L	0-1	60
	18-24	270	5-L	0-1	220		1-6	30
	24-30	230		1-17	180		6-41	10
	30-39	30		17-33	220		41-46	20
				33-37	40			
2-R	0-2	650						
	2-7	30	6-R	0-1	100			
	7-10	40		1-6	40			
	10-12	10		6-33	30			
				33-37	60			
2-M	0-35	200		37-40	50			
	35-48	140						
	48-60	80	6-M	0-3	230			
	60-70	10		3-17	180			
				17-33	150			
2-L	0-4	150		33-37	110			
	4-12	40		37-43	40			
	12-52	30						
			6-L	0-3	230			
3-R	0-11	170		3-4	190			
	11-16	70		4-12	170			
	16-20	60		12-33	200			
	20-31	20		33-34	NA†			
				34-45	20			
3-M	0-15	190						
	15-19	70	7-R	0-1	120			
	19-24	10		1-7	90			
				7-13	30			
3-L	0-7	110		13-46	40			
	7-16	60		46-52	30			
	16-21	30		52-54	20			
	21-41	10						

APPENDIX D-1.1 - continued

Canal I			Canal II			Control		
Sta.*	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
			7-M	0-4	90			
				4-10	50			
				10-13	70			
				13-20	60			
				20-44	80			
				44-52	10			
			7-L	0-6	60			
				6-13	20			
				13-20	30			
				20-25	20			
				25-30	40			
				30-38	60			
				38-49	70			
				49-55	20			

* Station number - Position on transect facing downstream (R - right, M - middle, L - left).

† No analysis.

APPENDIX D-1.2

Organic matter content of bottom cores, finger canals III and IV. Big Pine Key, Florida, November, 1973.

Canal III		
Sta*	Core Increment (cm)	Volatile Solids (mg/kg)
8-R	0-1	120
	1-4	40
	4-10	20
	10-12	40
	12-15	30
8-M	0-1	160
	1-3	30
	3-20	20
	20-23	NA†
	23-30	NA†
8-L	0-2	20
	2-5	40
	5-10	20
	10-17	NA†
	17-20	NA†
9-R	0-1	60
	1-2	50
	2-7	40
	7-14	30
	14-26	NA†
	26-43	10
9-M	0-1	60
	1-7	10
	7-26	30
9-L	0-1	60
	1-2	80
	2-11	30
	11-13	20
	13-20	30
10-R	0-3	70
	3-12	50
	12-20	NA†
	20-28	20
10-M	0-5	90
	5-15	120
	15-35	30

Canal IV		
Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
12-R	0-11	70
	11-18	40
	18-35	30
12-M	0-7	90
	7-26	20
12-L	0-1	70
	1-10	60
	10-20	30
13-R	0-9	70
	9-27	30
	27-51	20
13-M	0-11	80
	11-21	50
	21-30	NA†
	30-33	20
13-L	0-10	70
	10-14	30
	14-40	20
14-R	0-7	50
	7-10	40
	10-20	20
	20-25	40
14-M	0-8	100
	8-18	30
	18-22	40
	22-26	30
14-L	0-4	70
	4-40	20

Control		
Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
11-R	0-1	100
	1-10	50
	10-21	60
	21-30	30
11-M	0-21	140
	21-78	80
	78-113	70
	113-129	50
	129-143	30
11-L	0-12	90
	12-36	70
	36-44	30
	44-56	60

APPENDIX D-1.2 - continued

Canal III			Canal IV			Control		
Sta.*	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
10-L	0-4	130						
	4-13	30						
	13-24	20						
	24-30	30						

* Station number - Position on transect facing downstream (R - right, M - middle, L - left).

† No analysis.

APPENDIX D-1.3

Organic matter content of bottom cores, special finger canal stations, Punta Gorda, Florida, November 1973.

Punta Gorda Special Stations		
Sta.*	Core Increment (cm)	Volatile Solids (mg/kg)
A-R	0-4	160
	4-46	130
	46-54	120
	54-67	70
	67-72	90
	72-77	10
A-L	0-7	190
	7-44	160
	44-58	110
	58-78	10
B-R	0-1	110
	1-11	80
	11-22	40
	22-33	10
B-L	0-2	160
	2-12	70
	12-25	60
	25-36	10
C-R	0-1	160
	1-6	50
	6-18	20
C-L	0-1	130
	1-6	110
	6-15	90
	15-28	20
D-R	0-1	170
	1-9	60
	9-13	20
	13-16	40
	16-33	30
D-M	0-4	210
	4-16	170
	16-35	160
	35-51	190
	51-60	160
	60-77	20
	77-83	40

Big Pine Key Special Stations		
Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
F-R	0-11	90
	11-17	30
	17-29	20
	29-34	10
F-M	0-2	190
	2-4	70
	4-15	30
	15-30	20
F-L	0-3	70
	3-9	40
	9-15	30
G-R	0-9	100
	9-18	20
	18-24	30
	24-38	20
G-M	0-11	60
	11-24	30
	24-46	20
G-L	0-18	100
	18-30	30
	30-37	40
H-R	0-7	220
	7-22	30
	22-59	20
	59-66	10
H-M	0-3	130
	3-15	30
	15-65	10
	65-71	40
H-L	0-6	60
	6-21	40
	21-35	10
	35-55	20
I-R	0-3	80
	3-8	60
	8-15	20

APPENDIX D-1.3
Continued

Punta Gorda Special Stations			Big Pine Key Special Stations		
Sta.*	Core Increment (cm)	Volitale Solids (mg/kg)	Sta.	Core Increment (cm)	Volatile Solids (mg/kg)
D-L	0-7	100	I-M	0-5	80
	7-17	130		5-22	40
	17-21	110			
	21-27	60	I-L	0-5	80
	27-35	30		5-14	50
				14-24	30
E-R	0-5	210			
	5-29	130			
	29-42	140			
	42-53	110			
	53-69	50			
	69-78	30			
E-L	0-5	190			
	5-49	170			
	49-65	90			
	65-74	30			
	74-82	40			

* Station number - Position on transect facing downstream (R - right, M - middle, L - left).

APPENDIX D-1.4

Organic Matter Content of Bottom Cores
Sea-Air Estate Canal at Marathon, Florida, August 1974

Station*	Core Increment (cm)	Volatile Solids (mg/kg)
15	0-1	36
	1-24	30
16	0-3	42
	3-10	44
	10-17	18
17	0-9	28
	9-24	14
18	0-9	59
	9-29	77
19	0-10	32

*Single core at mid-channel.

APPENDIX D-1.5

Organic Matter Content of Bottom Cores
Atlantic Beach Canals, North Carolina, September 1974

Station*	Core Increment	Volatile Solids (g/kg)
1-L	0-30	112
	30-45	21
	45-50	8
1-M	0-28	112
	28-38	80
	38-46	5
1-R	0-24	130
	24-31	91
	31-36	17
2-L	0-2	12
	2-9	2
	9-11	8
2-M	0-2	13
	2-8	7
	8-14	7
2-R	0-1	16
	1-8	8
	8-14	5
3-L	0-1	67
	1-5	6
	5-11	4
3-M	0-2	34
	2-14	7
	14-17	20
3-R	0-1	30
	1-11	11
	11-13	8
4-L	0-11	170
	11-19	12
4-M	0-15	129
	15-19	6
4-R	0-1	148
	1-11	13
5-R	0-2	11
	2-12	7
5-M	0-1	138
	1-18	40
	18-32	43
5-L	0-1	16
	1-12	12
	12-23	16
	23-29	15
6-Rep 1	0-3	6
	3-20	5
6-Rep 2	0-3	4
	3-19	5
6-Rep 3	0-1.5	290
	1.5-5	12
	5-20	6
8-M	0-1	125
	1-16	8
	16-30	25
8-L	0-1	400
	1-20	60
9-R	0-16	6
9-M	0-3	430
	2-10	34
	10-16	4
9-L	0-4	159
	4-24	124
	24-40	9
9A-Rep 1	0-1	404
	1-5	61
	5-15	135
	15-18	67
10-L	0-1.5	107
	1.5-15	6
	15-60	4
10-M	0-1	2
	1-12	NS
	12-37	4
10-R	0-2	491
	2-15	7
	15-45	2

*Station number is position on transect facing downstream (R - right, M - middle, L - left). Noncanal stations have replicate samples.

Appendix D-2.1

Particle size of sediments, finger-fill canals, Punta Gorda and Big Pine Key, Florida, November 1973.

Location	Station	Inorganic Component Subtended by Organic Fraction (all as % total dry weight)						
		Medium Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
Punta Gorda	1	--	<1	<1	37.1	18.1	27.2	3.7
		--	<1	<1	4.6	2.4	5.8	<1
" "	2	--	<1	1.5	72.8	13.9	5.2	1.6
		--	<1	1.0	1.0	<1	1.7	<1
" "	3	--	<1	1.2	68.9	1[illegible]6	5.6	3.2
		--	<1	1.0	1.7	1	2.1	<1
" "	4	NA	NA	NA	NA	NA	NA	NA
" "	5	NA	NA	NA	NA	NA	NA	NA
" "	6	--	<1	<1	44.9	22.8	16.9	3.4
		--	<1	<1	4.5	1.5	4.8	<1
" "	7	--	1.0	3.0	53.3	20.2	12.1	2.1
		--	<1	<1	2.0	1.7	3.2	1.0
" "	A	NA	NA	NA	NA	NA	NA	NA
" "	B	--	<1	<1	47.5	28.7	16.5	2.1
		--	<1	<1	1.6	1.0	1.8	<1
" "	C	--	<1	1.0	43.1	23.6	23.9	2.3
		--	<1	<1	1.8	1.2	2.4	<1
" "	D	--	<1	1.0	31.4	13.9	40.3	--
		--	<1	<1	3.5	4.7	4.1	--
" "	E	--	<1	<1	44.4	18.8	21.9	4.0
		--	<1	<1	3.3	2.1	4.7	<1
Big Pine Key	8	--	<1	1.0	19.2	25.6	51.1	3.4
		--	<1	<1	1.0	<1	1.7	1.0
" " "	9	--	<1	<1	1.5	1.9	84.3	8.2
		--	<1	<1	<1	<1	2.4	1.0
" " "	10	--	<1	5.1	12.4	3.3	69.9	5.1
		--	<1	<1	<1	<1	2.4	1.0
" " "	11	2.1	1.0	1.0	22.9	18.2	39.3	5.1
		<1	<1	1.0	3.4	2.0	3.8	1.0

Appendix D-2.1 (continued)

Location	Station	Inorganic Component Subtended by Organic Fraction (all as % total dry weight)						
		Medium Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
Big Pine Key	12	--	1.0	2.3	34.4	160.	33.6	7.0
		--	<1	<1	1.9	1.0	1.9	1.0
" " "	13	<1	--	2.3	9.5	4.1	78.5	--
		<1	--	<1	1.0	<1	3.4	--
" " "	14	4.4	1.4	2.8	21.3	11.5	44.7	3.8
		1.3	1.0	1.4	2.1	1.8	2.5	<1
" " "	F	--	1.7	10.4	48.7	13.8	15.7	3.6
		--	<1	1.0	1.9	1.0	1.3	1.0
" " "	G	--	<1	1.0	37.3	23.3	32.1	2.6
		--	<1	<1	1.0	<1	1.2	<1
" " "	H	--	<1	1.0	4.3	2.4	83.2	5.0
		--	<1	<1	<1	<1	2.0	<1
" " "	I	--	<1	1.6	22.0	17.7	49.0	3.6
		--	<1	<1	1.1	<1	2.9	1.0

NA - No analysis, insufficient sample size.

APPENDIX D-2.2

Particle Size of Sediments from Sea-Air Estate Canal at Marathon, Florida, August 1974

Station	Inorganic Component Subtended by Organic Fraction (% total dry wt)						
	Medium Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
15			1.4	20.5	13.2	56.9	4.5
			<1	<1	<1	2.1	<1
16		<1	1.0	19.1	12.3	48.3	12.7
		<1	1.0	1.1	<1	3.7	1.0
17			<1	1.0	5.2	89.1	2.8
			<1	<1	<1	1.5	<1
18			2.2	14.0	13.9	32.5	22.2
			1.0	1.0	<1	2.3	10.4
19	9.4	9.5	38.0	29.9	5.8	13.8	3.3
	1.0	<1	1.0	1.0	<1	[illegible].0	1.0

APPENDIX D-2.3

Particle Size of Sediments from Atlantic Beach Canals, North Carolina, September 1974

Station	Inorganic Component Subtended by Organic Fraction (% total dry wt)						
	Medium Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
1			13.7	29.0	4.0	13.5	25.8
			2.1	4.3	1.0	2.4	4.4
2	1.0[1]	1.0	1.0	92.3	1.0	2.4	<1
	<1	<1	<1	<1	<1	<1	<1
3	1.0[1]	1.0	1.0	73.6	3.3	11.3	2.1
	<1	<1	<1	<1.3	<1	<1.0	<1
4		<1	1.3	35.5	3.8	16.4	30.4
		<1	<1	4.3	1.0	2.2	4.9
5		<1	1.0	82.5	1.6	6.9	4.0
		<1	<1	1.7	<1	1.0	1.0
6	1.8[2]	<1	<1	95.7	1.0	1.0	<1
	<1	<1	<1	<1	<1	<1	<1
9		<1	1.3	47.7	6.2	24.2	9.9
		<1	<1	5.3	1.1	2.8	1.5
10		<1	<1	93.9	1.0	1.9	<1
		<1	<1	<1	<1	<1	<1

[1] Polychaete cases only.
[2] 100 percent shell material.

Appendix D-3

Sediment Pesticide Scan
Finger Fill Canal Study

	µg/kg Approximate Minimum Detection Limit*
Aldrin	0.25
Lindane	0.1
Chlordane	2.5
Chlorobenzilate	25
DDD	0.5
DDE	0.5
DDT	1.0
Dieldrin	0.5
Endrin	1.0
Heptachlor Epoxide	0.5
Heptachlor	0.25
Methoxchlor	5.0
Toxaphene	15
Diazinon	10
Guthion	25
Methyl Parathion	1
Parathion	2
Malathion	4
Ethion	4
Trithion	2
Mirex	1
Dimethoate (Cygon)	50
PCB's	5.0

*depends upon sample size

Appendix E-1.1

Kinds of benthic invertebrates collected from finger-fill canals, Punta Gorda and Big Pine Key, Florida, November 1973.

Organism	Punta Gorda							Big Pine Key						
	Station							Station						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Annelida														
Polychaeta														
Errantia		X	X	X	X	X	X		X	X	X	X	X	X
Sedentaria		X		X		X	X	X	X	X	X	X	X	X
Echinodermata														
Stelleroidea														
Ophiuroidea														
Ophiurida														
Amphiuridae				X									X	X
Coelenterata														
Anthozoa									X					
Mollusca														
Amphineura														
Polyplacophora														
Neoloricata														
Ishnochitonidae														
Tonicella sp.		X							X					
Bivalvia														
Prosobranchia														
Taxodonta														
Arcidae														
Arca sp.				X										
Anisomyaria														
Mytilidae														
Mytilus recurvus	X			X		X								
Amygdalum sp.			X	X		X	X							
Carditidae														
Cardita sp.								X		X			X	X
Heterodonta														
Veneridae														
Chione sp.													X	
Tellinidae														
Tellina sp.	X	X	X	X		X	X	X	X	X	X			
Gastropoda														
Prosobranchia														
Archaeogastropoda														
Trochidae														
Calliostoma sp.								X	X	X				
Neritidae														
Nerita sp.		X				X								
Neritina sp.		X					X							

APPENDIX E-1.1 (continued)

Organism	Punta Gorda							Big Pine Key						
	Station							Station						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mullusca														
Gastropoda														
Prosobranchia														
Archaeogastropoda														
Lepetellidae														
Addisonia sp.									X					
Mesogastropoda														
Littorinidae														
Littorina sp.											X			
Columbellidae														
Mitrella sp.							X				X			
Turridae														
Clathrodrillia sp.										X				
Neogastropoda														
Mitridae														
Mitra sp.								X		X				
Fasciolaria sp.													X	
Opisthobranchia														
Cephalaspidea														
Bullidae														
Bulla sp.								X	X	X			X	X
Atyidae														
Haminoea sp.				X			X	X	X	X	X		X	X
Arthropoda														
Crustacea														
Ostracoda									X					
Cirripedia														
Thoracia														
Malacostraca														
Nebaliacea														
Nebalidae														
Nebalia bipes								X	X	X	X	X	X	X
Mysidacea														
Mysidae				X			X				X			
Cumacea														
Leuconidae														
Leucon sp.											X			
Tanaidacea														
Paratanaidae								X	X	X			X	X
Tanaidae														X
Isopoda														
Anthuridae									X		X			
Sphaeromatidae								X	X	X	X	X	X	X
Idoteidae			X					X		X	X	X	X	X

APPENDIX E-1.1 (continued)

Organism	Punta Gorda							Big Pine Key						
	Station							Station						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Arthropoda														
Crustacea														
Malacostraca														
Amphipoda														
Gammaridae			X	X	X			X	X	X	X	X	X	X
Corophiidae		X	X	X				X		X		X	X	X
Ampithoidae			X	X								X	X	X
Melitidae								X	X	X	X		X	X
Paramphithoidae											X			
Aoridae								X		X			X	X
Photidae														X
Calliopiidae							X		X	X	X	X		
Ampeliscidae		X	X	X			X							
Lysianassidae								X	X	X	X	X	X	X
Atylidae														X
Decapoda														
Majidae			X											
Portunidae														
Callinectes sapidus				X										
Xanthidae														
Rhithropanopeus harrisii				X										
Palaemonidae			X	X				X	X		X	X	X	X
Merostomata														
Xiphosurida														
Xiphosurida														
Limulidae														
Limulus polyphemus										X				
Insecta														
Pterygota														
Diptera														
Chironomidae														
Chironomini														
Dicrotendipes poss. neomodestus		X				X								
Polypedilum parascalaenum						X								
Tanytarsini														
poss. Paratanytarsus sp.								X	X		X	X		
Metriocnemini														
poss. Clunio sp.								X	X		X			X
Odonata														
Libellulidae														
Erythrodiplax sp.														X
Coleoptera														
Dytiscidae														
Derovatellus sp.									X					
Number of taxa/station	2	10	10	14	2	9	9	19	22	19	19	12	18	20

APPENDIX E-1.2

Numbers of benthic invertebrates collected from finger-fill canals, Punta Gorda, Florida, November 1973.

Organism	Station 1					Station 2				Station 3					Station 4				Station 5				Station 6				Station 7			
	Replicate					Replicate				Replicate					Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Annelida																														
Polychaeta																														
Errantia										258	43	43	258		481	259	13	689		172		43	129	129	43	43	43	43		43
Sedentaria															65	39		26												
Echinodermata																														
Stelleroidea																														
Ophiuroidea																														
Ophiurida																														
Amphiuridae																		65												
Mollusca																														
Bivalvia																														
Prosobranchia																														
Taxodonta																														
Arcidae																														
Arca sp.																26														
Anisomyaria																														
Mytilidae																														
Mytilus recurvus			43												26	78														
Amygdalum sp.													86	43	13		52												43	
Heterodonta																														
Tellinidae																														
Tellina sp.							43		258				129		65		130	39												172
Gastropoda																														
Prosobranchia																														
Archaeogastropoda																														
Neritidae																														
Nerita sp.									86																					
Neritina sp.								43																					43	
Mesogastropoda																														
Columbellidae																														
Mitrella sp.																														43
Opisthobranchia																														
Cephalaspidea																														
Atyidae																														
Haminoea sp.																		13												43

APPENDIX E-1.2 (continued)

Organism	Station 1					Station 2				Station 3					Station 4				Station 5				Station 6				Station 7			
	Replicate					Replicate				Replicate					Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Arthropoda																														
Crustacea																														
Cirripedia																														
Thoracia																														
Balanidae																														
Blanus sp.										1591	43																			
Malacostraca																														
Mysidacea																														
Mysidae																		13										43		
Isopoda																														
Idoteidae										86				43																
Amphipoda																														
Gammaridae										43					325	793	13	39												
Corophiidae										43			86	430		273	52	91	129											
Ampithoidae										301					117	442	78	65												
Calliopiidae																												43		
Ampeliscidae												43	43	43	13															43
Decapoda																														
Majidae										86																				
Portunidae																														
Callinectes sapidus																13														
Xanthidae																														
Rhithropanopeus harrisii																91		26												
Palaemonidae										43						52														
Total No. organisms/ m^2/replicate	0	0	0	43	0	344	0	43	43	2451	86	86	602	559	1105	2066	286	1118	129	172	0	43	129	129	43	43	43	129	86	344
Mean No. organisms/ m^2/station	11					108				757					1144				86				86				150			
Coeficient of Variation (percent)	200.0					148.0				129.0					63.6				91.3				51.7				88.9			

APPENDIX E-1.3

Numbers of benthic invertebrates collected from finger-fill canals, Big Pine Key, Florida, November, 1973.

Organism	Station 8				Station 9				Station 10				Station 11				Station 12				Station 13				Station 14			
	Replicate				Replicate				Replicate				Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Annelida																												
Polychaeta																												
Errantia	52	156	13	65	117	364	26	13	260	26	260	26	1118	301		1032	43	43		43	86		43	172				43
Sedentaria				13	26	169		24	91		13	39	129	215				43	172			43			215	344	43	1505
Mollusca																												
Bivalvia																												
Prosobranchia																												
Anisomyaria																												
Carditidae																												
Cardita sp.		13										13													215	129	301	129
Heterodonta																												
Tellinidae																												
Tellina sp.		26		13							13	13		43	172	172												
Gastropoda																												
Prosobranchia																												
Archaeogastropoda																												
Trochidae																												
Calliostoma sp.		13					26					13																
Opisthobranchia																												
Cephalaspidea																												
Bullidae																												
Bulla sp.		13		13			13																			43	43	
Atyidae																												
Haminoea sp.	39	39				13		13			52	26															86	43
Arthropoda																												
Crustacea																												
Malacostraca																												
Nebaliacea																												
Nebalidae																												
Nebalia bipes			13			13																		86				
Tanaidacea																												
Paratanaidae				13		13					26														43			

APPENDIX E-1.3 (continued)

Organism	Station 8				Station 9				Station 10				Station 11				Station 12				Station 13				Station 14			
	Replicate				Replicate				Replicate				Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Arthropoda																												
Crustacea																												
Malacostraca																												
Isopoda																												
Sphaeromatidae				13	26	39	26																					
Idoteidae				13																					43			129
Amphipoda																												
Gammaridae		13	78	13	78				13												86			43				
Corophiidae									26	26	26	39					86	258	129	43	1290	344	602	688	731	989	1892	2623
Ampithoidae																					344	129		344	1118	215	172	215
Melitidae									26																	86		
Aoridae											26														387	43		
Photidae																									43			
Calliopiidae	13	13				91	91	52	26	13	39																	
Lysianassidae			13	13		26		26	13	13								43				43			86		43	43
Atylidae																									43			
Decapoda																												
Palaemonidae					13																				86			43
Insecta																												
Pterygota																												
Diptera																												
Chironomidae																												
Paratanytarsus sp. (poss.)					13								43															
Clunio sp. (poss.)																									43			
Total No. organisms/ m^2/replicate	104	273	117	168	273	728	182	130	455	78	455	169	1290	559	172	1204	129	387	301	86	1849	515	645	1333	3053	1849	2580	4773
Mean No. organisms/ m^2/station	166				328				289				806				226				1086				3064			
Coeficient of Variation (percent)	46.4				83.2				67.4				66.2				62.9				57.4				40.6			

APPENDIX E-1.4

Numbers and kinds of benthic macroinvertebrates collected for Doctors Arm Study from finger-fill canals at Big Pine Key, Florida, August 1974.

Organism	Station 8				Station 9				Station 10				Station 12				Station 13				Station 14			
	Replicate				Replicate				Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Coelentera																								
Hydroza						104																		
Porifera									13				13	52										
Rhynchocoela																								
Anopla									13															
Nematuda						78			130						13	13			13	26				
Mollusca																								
Gastropoda																								
Neogastropoda																								
Modulidae																								
Modulus modulus				13		13		13																
Conidae																								
Conus sp.						26																		
Opisthobranchia																								
Cephalaspidae																								
Bullidae																								
Bulla sp.					13												78		13	78				
Bivalvia																								
Anisomyaria																								
Carditidae						13																		
Cardita sp.	13									13														
Heterodonta																								
Veneridae																								
Chione sp.																								13
Parastarte sp.	26	13				13																		
Tellinidae																								
Tellina sp.	13	13	13		26	39					26		26		13	39			13	65	26	26	65	
Annelida																								
Oligochaeta																								
Plesiopora																								
Tubificidae													78		156	65	65		26	39	91	260	221	416
Polychaeta																								
Errantia	104	26	117	104	260	260	65	26	104		52	52	26	13		143	104	130	182	39	13	26	26	273
Sedentaria	130	26	104	52	260	39	13				13			13			143		260	676			26	
Arthropoda																								
Pycnogonida									13															
Crustacea																								
Malocostraca																								
Tanaidacea																								
Paratanaidae	13								52															
Isopoda																								
Sphaeromatidae	13	13	39					13																
Idoteidae																								65
Stenetriidae					13				13															
Amphipoda																								
Gammaridae	117		39					13	26															
Dexaminidae	65		26						65															
Amphithoidae																		13						
Aoridae	26	26	26			52		13	26								13	91						78
Lysianassidae	26							52	208	13		91												
Decapoda																								
Penaeidae	13		39		13	39		26	13															
Palaemonidae																								13
Insecta																								
Pterygota																								
Diptera																								
Chironomidae																								
poss. *Paratanytarsus* sp.					13	13																		
Echinodermata																								
Holothuroidea																								
Dendrochirota																						13		
Ophiuroidae																								
Ophiurida																								
Amphiuridae									13													13		52
Total # org./m^2/replicate	559	117	403	169	676	611	78	156	689	26	91	143	143	78	182	260	403	234	507	923	130	338	338	910
Mean # org./m^2/station	312				380				237				166				517				429			
Coefficient of variation (%)	66				81				128				46				57				78			
Number of taxa per station	13				17				16				6				8				10			

APPENDIX E-1.5

Numbers and kinds of benthic macroinvertebrates collected for Sea-Air Estates Study from finger-fill canals at Marathon, Florida, August 1974.

Organism	Station 15				Station 16				Station 17				Station 18				Station 19			
	Replicate				Replicate				Replicate				Replicate				Replicate			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Coelentera																				
Anthozoa																				
Actiniaria															13					
Nematoda															13		273	182	117	403
Mollusca																				
Amphineura																	13			
Gastropoda																				
Archaeogastropoda																				
Turbinidae																				
Turbo sp.																			91	
Cerithiidae																				
Cerithium sp.	182	39		65													13	26	52	26
Mesogastropoda																				
Littorinidae																				
Echinella sp.																		13		
Caecidae																				
Caecum sp.									13	26		13					13		13	
Pyramidellidae																				
Turbonilla sp.									13	13								13		
Neogastropoda																				
Marginellidae																				
Marginella sp.		13															13		39	
Mitridae																				
Mirtra sp.					13															
Conidae																				
Conus sp.																	26	13	39	13
Turridae																				
Clathrodrilla sp.										39							13	39	13	13
Mangilia sp.																		26		
Opisthobranchia																				
Cephalaspidea																				
Bullidae																				
Bulla sp.	78	52		52	13	13	65	52	39	13	39	39	78		26					
Nudibranchia																				13
Scaphopoda																				
Dentalidae																				
Dentalium																				13
Bivalvia																				
Anisomyaria																				
Carditidae																				
Cardita sp.																			13	
Heterodonta																				
Veneridae																				
Chione sp.				13	13									13			39	26	78	
Tellinidae																				
Tellina sp.	91	26			208	221	78	312		195	312	273	689	338	689	572				52
Annelida																				
Oligochaeta																				
Plesiopora																				
Tubificidae		130													52	13				
Polychaeta																				
Errantia	52	117		13	117	39	78	91	65	78	52	26	39		13		793	975	819	2327
Sedentaria	91	312			78	13		91	169	39	39		65		13		260	338	247	715
Arthropoda																				
Pycnogonida															13					
Crustacea																				
Malacostraca																				
Nebaliacea																				
Nebalidae																	78	130	234	299
Mysidacea																				
Mysidae																				65
Tanaidacea																				
Paratanaidae																	65	91	247	273
Isopoda																	26	26	78	13
Anthuridae																	52	65	65	39
Sphaeromatidae										13									78	13
Cirolanidae																		13		
Idoteidae																	39	39	13	13
Stenetriidae																	286	182	598	416
Gnathiidae																			52	
Amphipoda																				
Gammaridae																	52	130	260	104
Dexaminidae																			13	
Leucothoidae																	13	13		52
Ampithoidae																	78			39
Aoridae					13				13								247	403	221	236
Photidae																	13		104	13
Lysianassidae																	65		91	91
Caprellidae																		26	117	26
Decapoda																				
Penaeidae																	39			
Palaemonidae																	26		39	
Paguridae																				13
Arthropoda (Cont'd)																				
Insecta																				
Pterygota																				
Diptera																				
Chironomidae																				
poss. *Clunio* sp.																			13	
Echinodermata																				
Ophiuroidea																				
Ophiurida																				
Amphiuridae		26									13		65	13	78	78	130	13	130	169
Total # org./m^2/replicate	494	715	0	143	455	286	221	546	312	416	455	351	936	364	910	663	2665	2782	3939	5447
Mean # org./m^2/station	338				377				383				718				3,708			
Coefficient of variation (%)	96				60				17				37				35			
Number of taxa per station	9				7				10				10				41			

APPENDIX E-1.6

Numbers and kinds of benthic macroinvertebrates collected from finger-fill canals at Atlantic Beach and Spooners Creek, North Carolina, September 1974.

Organism	Atlantic Beach																																		Spooners Cr.		
	Station 1				Station 2						Station 3				Station 4				Station 5				Station 6				Station 9				Station 10				S-1	S-3	S-4
	Replicate				Replicate						Replicate				Replicate				Replicate				Replicate				Replicate				Replicate						
	1	2	3	4	1	2	3	4	5	6	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
Annelida																																					
Polychaeta																																					
Errantia					26					39	104	156	234	273											13	13					130	117	52	91			
Sedentaria					91	13				104	52	273	390	390									78	52	26	78				52	169	182	78	156	325	130	26
Mollusca																																					
Bivalvia																																					
Protobranchia																																					
Heterodonta																																					
Venerida																																					
Chione sp.					13								13																								
Lipodonta																																					
Solemyidae																																					
Solemya velum														13																							
Gastropoda																																					
Prosobranchia																																					
Archaeogastropoda																																					
Acmaeidae																																					
Acmaea sp.																															13						
Mesogastropoda																																					
Littorinidae																																					
Littorina sp.					13																																
Nassariidae																																					
Nassarius sp. 1													26																								13
Nassarius sp. 2												13																						26			
Pyramidellidae																																					
Turbonilla sp.													13	13																							
Neogastropoda																																					
Fasciolariidae																																					
Fasciolaria sp.																															13						
Arthropoda																																					
Crustacea																																					
Ostracoda																																				13	
Malacostraca																																					
Mysidacea																																					
Mysidae											26	13																									
Cumacea																								13							39	26					
Amphipoda																																					
Ampithoidae																																					
Cymadusa filosa																																					78
Liljeborgiidae																																					
Listriella clymenellae											78	52	156	221																				13			
Listriella barnardi												169	130	65																							
Oedicerotidae																																					
Ampelisca abdita														39																26	78	78	26	13		104	
Ampelisca verrilli																							13	65													
Ampelisca sp.											26		26																								
Phoxocephalidae																																					
Trichophoxus floridanus																							39	26		13											
Decapoda																																					
Callianassidae																																					
Callianassa atlantica																																					26
Total # orgs./m^2/replicate	0	0	0	0	143	13	0	0	0	143	286	676	988	1014	0	0	0	0	0	0	0	0	130	156	39	104	0	0	0	78	442	403	156	299	325	247	143
Mean # orgs./m^2/station	0				50						741				0				0				107				20				325						
Coefficient of Variation (%)					157.97						45.88												46.92				195.00				29.63						
Number of taxa/m^2/station	0				4						12				0				0				5				2				8				1	3	4

APPENDIX E-2.1

Canal III, Sta. 8

Macrophyte Biomass (G/m^2)
Big Pine Key, Florida
November, 1973

***weights in G/m^2**

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium													
Cladophora	.05512	.06452	1.10516	.83376				Total = 2.05856			.05-1.10	.51464	.24:1.0
Batophora oerstedi	.14504		4.99248	6.80312				T=11.94064			.14-6.80	3.98021	1.29:1.0
Acetabularia crenulata	.00212		.00056	.00544				T=.00812			.0005- .0005	.00271	.27:1.0
Valonia		1.01116		2.47524				T=3.4864			1.01-2.47	1.7432	.97:1.0
Dictyosphaeria cavernosa		.04848	.59132	.02160				T=.6614			.02-.59	.22047	.16:1.0
Anadyomene stellata	.00672		.23104	2.73644				T=2.9742			.006-2.74	1.07065	.55:1.0
Caulerpa verticillata	2.12072	.23316	.00776					T=2.36164			.008-2.12	.78721	.20:1.0
C. floridana				.10264				T=.10264			.10	.10264	10.18:1.0
C. cupressoides													
Avrainvillea levis													
Udotea													
Penicillus dumetosus **Penicillus**	1.19156		11.63964	2.26924				T=15.10044			1.19-11.64	5.03348	3.35:1.0
Halimeda tuna													
H. incrassata	1.47852		.06696					T=1.54548			.07-1.48	.77274	.98:1.0
Codium													
Vaucheria													

APPENDIX E-2.1

Canal III, Sta. 8 (cont'd.)

* weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASh
Amphiroa rigida	.15680							T=.15680		.16	.15680	.01:1.0
Gracilaria												
Eucheuma isiforme				.08012				T=.08012		.08	.08012	1.32:1.0
Ceramium												
Polysiphonia howei												
Oscillatoria	.13588		5.29428	.28380				T=5.71396		.13-5.29	1.90465	1.38:1.0
Ulva		.05460						T=.0546		.05	.05460	.41:1.0

APPENDIX E-2.1

Canal III, Sta. 8 (cont'd)

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii	4.83416		.94008	5.16764				T=10.94188			.94-5.17	3.64729	1.65:1.0
Thalassia testudinium				.37208				T=.37208			.37	.37208	7.12:1.0
Total	10.13	1.41	24.87	21.15									
$\overline{X}$	14.39												
	16.99												

APPENDIX E-2.1

Canal III, Sta. 9

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Rep. 10*	Range	X̄ (mean)	(total) Ratio of Org.-ASH
Rhizoclonium													
Cladophora	.14184		.86916					T=1.0110			.14-.87	.5055	.29:1.0
Batophora oerstedi	.00184		.55756					T=.5594			.001-.56	.2797	2.68:1.0
Acetabularia crenulata			.00836					T=.00836	-		.008	.00836	5.22:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata													
Caulerpa verticillata													
C. floridana													
C. cupressoides													
Avrainvillea levis													
Udotea													
Penicillus dumetosus													
Penicillus		2.79136						T=2.79136			2.79	2.79136	1.07:1.0
Halimeda tuna													
H. incrassata													
Codium													
Vaucheria			.05456					T=.05456			.05	.05456	.76:1.0

APPENDIX E-2.1

* weights in G/m^2

Canal III, Sta. 9

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Range	$\bar{x}$ (mean)	Ratio of Org.-ASh
Amphiroa rigida												
Gracilaria			.02056					T=.02056		.02	.02056	30.23:1.0
Eucheuma isiforme												
Ceramium												
Polysiphonia howei												
Oscillatoria				.34708				T=.34708		.35	.34708	.03:1.0
Ulva			.01188					T=.01188		.01	.01188	1.82:1.0

APPENDIX E-2.1

anal III, Sta. 9

* weights in G/m^2

escular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*		Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
alodule wrightii	10.21084			11.45960				T=21.67044			10.21-11.46	10.83522	16.04:1.0
halassia testudinium													
	13.14	0	1.52	11.81									
$\overline{X}$	6.62												
±	10.84												

APPENDIX E-2.1

Canal III, Sta. 10

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium													
Cladophora	.02144	.00560	.05316	.24000		2.37136			T=2.69156		.005-.24	.53831	.32:1.0
Batophora oerstedi	.43424	.32852	.93936	2.09512		.74776	.24272	.57660	T=5.39432		.24-2.09	.77062	.77:1.0
Acetabularia crenulata	.00692		.04500	.00524	.00648				T=.06364		.005-.04	.01591	2.81:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata	.01712								T=.01712		.02	.01712	.45:1.0
Caulerpa verticillata													
C. floridana	.10916							.02032	T=.12948		.02-.11	.55596	.86:1.0
C. cupressoides													
Avrainvillea levis													
Udotea													
Penicillus dumetosus Penicillus	5.19316	5.54460	5.28468	6.35276	2.17116	7.31176	7.37268	1.51496	T=40.74576		1.51-7.37	5.09322	1.74:1.0
Halimeda tuna													
H. incrassata	.00904								T=.00904		.009	.00904	.42:1.0
Codium	3.27264								T=3.27264		3.27	3.27264	.24:1.0
Vaucheria													

Canal III, Sta. 10

* weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rer. 9*	Rep.10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Amphiroa rigida	3.79796	.28044	.16360					T=4.2420			.16-3.80	1.4140	.12:1.0
Gracilaria	.01292		.06004					T=.07296			.01-.06	.03648	.15:1.0
Eucheuma isiforme													
Ceranium													
Polysiphonia howei													
Oscillatoria	2.18080	1.74592					4.12860	2.65012	T-14	.63216	1.75-4.13	2.67636	.62:1.0
Ulva													

APPENDIX E-2.1

Canal III, Sta. 10

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii	8.31700	4.55228	1.64292	4.62076	7.72324	.58688	2.60156	9.09904	T=39.14368		59-9.10	4.89296	4.78:1.0
Thalassia testudinium													
	23.37	19.04	8.23	13.31	9.90	11.01	14.3	13.86					
$\overline{X}$	14.13												
±	4.15												

APPENDIX E-2.1

Sta. 11

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium													
Cladophora	.45404	.08256	.00424					T=.54084			.004-.45	.18028	.55:1.0
Batophora oerstedi													
Acetabularia crenulata		.01820						T=.01820			.02	.01820	2.38:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata	.30148	.80924						T=1.11072			.30-.81	.55536	.83:1.0
Caulerpa verticillata	5.02708	2.0162	.00016					T=7.04344			.0002-5.03	2.34781	.56:1.0
C. floridana	.01112	.20364						T=.21476			.01-.20	.10738	1.52:1.0
C. cupressoides													
Avrainvillea levis													
Udotea													
Penicillus dumetosus **Penicillus**	2.22760	.57224						T=2.799984			.57-2.23	1.39992	3.35:1.0
Halimeda tuna	8.67968	10.75440						T=19.43408			8.68-10.75	9.71704	1.06:1.0
H. incrassata	12.01680	6.30696						T=18.32376			6.31-12.02	9.16188	.39:1.0
Codium													
Vaucheria	.03136							T=.03136			.03	.03136	28:1.0

APPENDIX E-2.1

Sta..11

* weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep.10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Amphiroa rigida		.06440						T=.06440			.06	.06440	1.15:1.0
Gracilaria	.02364							T=.02364			.02	.02364	3.21:1.0
Eucheuma isiforme	7.22204	.18760	.04984					T=7.45948			.05-7.22	4.89384	.96:1.0
Ceramium													
Polysiphonia howei													
Oscillatoria													
Ulva		.00872						T=.00872			.009	.00872	.12:1.0

APPENDIX E-2.1

Sta. 11

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\bar{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii	.10780	2.91808						T=3.02588			.11-2.92	1.51294	1.41:1.0
Thalassia testudinium	1.20136	1.72504	.05136					T=2.97776			.05-1.72	.99259	2.69:1.0
	37.30	25.67	.1056										
$\bar{X}$	21.02												
±	19.03												

APPENDIX E-2.1

Canal IV, Sta. 12

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium													
Cladophora	1.16824		.00908	5.47392	.16796			T=6.8192			.009-5.47	4.20480	.05:1.0
Batophora oerstedi	.51988	1.02064	.11328	.68872				T=2.34252			.11-1.02	.58563	.66:1.0
Acetabularia crenulata	.03836	.17380	.04212					T=.25428			.04-.17	.08476	4.64:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata													
Caulerpa verticillata	.94576	.34824	9.11244	3.28680	4.01676			T=17.71200			.35-9.11	3.5424	1.60:1.0
C. floridana	.01264	.15672	24.52332	1.73704	6.79596			T=33.22568			.01-24.52	6.65414	.95:1.0
C. cupressoides													
Avrainvillea levis													
Udotea				.67052				T=.67052			.67	.67052	3.50:1.0
Penicillus dumetosus				1.97088	.81468			T=2.78556			.81-1.97	1.39278	.74:1.0
Penicillus	.20456	.04212	.52232	1.87476				T=2.64376			.04-187	.66094	.92:1.0
Halimeda tuna	.13872	.13376	1.77208	.68856	.11872			T=2.85184			.11-1.77	.57034	.9[illegible]:1.0
H. incrassata		.16412	.01280	5.40284	6.78736			T=12.36712			.01-6.79	3.09178	.55:1.0
Codium											.002-.34	.16996	2.66:1.0
Vaucheria		.33772	.00220					T=.33992					

APPENDIX E-2.1

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep.10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Amphiroa rigida													
Gracilaria													
Eucheuma isiforme													
Ceramium		.03444	.19404					T=.22848			.03-.19	.11424	25.05:1.0
Polysiphonia howei		.19680	.06180					T=.2586			.06-.20	.1293	1.66:1.0
P. sp.			.09724					T=.09724			.10	.09724	3.72:1.0
Oscillatoria			.81440	.57336				T=1.38776			.57-.81	.69388	2.00:1.0
Ulva	.0200	.07176						T=.09176			.02-.07	.04588	2.56:1.0

APPENDIX E-2.1

Canal IV, Sta. 12

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\bar{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii		.03076	.15760		.48952			T=.67788			03-.49	.22596	2.20:1.0
Thalassia testudinium		.44128						T=.44128			.44	.44128	5.49:1.0
	3.05	3.15	37.43	22.37	19.19								
$\bar{X}$	17.04												
s	17.96												

APPENDIX E-2.1

Canal IV, Sta. 13

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium													
Cladophora	.39120	2.05332		.86480				T=3.30932			.39-2.05	1.10311	.67:1.0
Batophora oerstedi		.12628	.00620					T=.13248			.006-.13	.06624	1.90:1.0
Acetabularia crenulata	.04096	.02380	.01524	.00344				T=.08344			.003-.04	.02086	3.97:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata		.06860						T=.0686			.07	.06860	1.53:1.0
Caulerpa verticillata	1.05752		5.99160	1.57948				T=8.6286			1.06-5.99	2.8762	.45:1.0
C. floridana	12.25268	4.98692		2.29635				T=19.53595			2.30-12.25	.51198	4.09:1.0
C. cupressoides													
Avrainvillea levis													
Udotea													
Penicillus dumetosus				.59088				T=.59088			.59	.59088	1.67:1.0
Penicillus	.61420	2.18148		2.49528				T=5.29096			.61-2.49	1.76365	1.60:1.0
Halimeda tuna	6.30120	.09456		5.28448				T=11.68024			.09-6.30	3.89341	1.17:1.0
H. incrassata	25.29204	3.75388	.00168	32.46152				T=61.50912			.002-32.46	15.37728	.31:1.0
Codium													
Vaucheria		.10664	.01076					T=.1174			.01-.11	.05870	1.29:1.0

APPENDIX E-2.1

* weights in G/m^2

Canal IV, Sta. 13

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep.10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Amphiroa rigida	.04824							T=.04824			.05	.04824	.40:1.0
Gracilaria													
Eucheuma isiforme		.04036						T=.04036			.04	.04036	1.58:1.0
Ceramium		.12276						T=.12276			.12	.12276	.37:1.0
Polysiphonia howei			.01572					T=.01572			.02	.01572	5.04:1.0
Oscillatoria													
Ulva	.46940	.15508						T=.62448			.15-.47	.54694	1.64:1.0

APPENDIX E-2.1

Canal IV. Sta. 13

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii	2.73088	3.81364	.00924	2.61728				T=9.17104			.009-3.81	2.29276	2.89:1.0
Thalassia testudinium													
	49.20	17.53	6.05	48.19									
$\overline{X}$	30.24												
±	34.72												

APPENDIX E-2.1

Canal IV, Sta. 14

*weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-ASH
Rhizoclonium		.02492						T=.02492			.02	.02492	3.08:1.0
Cladophora	3.60952	4.37960	.90932	3.01968	.42248			T=12.3370			.42-4.38	2.46812	.75+1.0
Batophora oerstedi	.00572	.43448		.01236	.01608			T=.468640			.006-.43	.11716	.88:1.0
Acetabularia crenulata	.03916	.21344						T=.25260			.04-.21	.12630	.42:1.0
Valonia													
Dictyosphaeria cavernosa													
Anadyomene stellata	.12648	.05356						T=.18004			.05-.13	.09002	1.39:1.0
Caulerpa verticillata	.60308	.99000	5.08152	1.46540				T=8.1400			.60-5.08	2.03500	1.57:1.0
C. floridana	7.03336	1.04896	11.19300	7.76524	7.6300			T=34.67056			1.05-11.19	6.93411	1.95:1.0
C. cupressoides		2.16624	.45056					T=2.6168			.45-2.17	1.25840	3.88:1.0
Avrainvillea levis													
Udotea		.17536						T=.17536			.17	.17536	6.97:1.0
Penicillus dumetosus		3.20344						T=3.20344			3.20	3.20344	6.19:1.0
Penicillus	6.96696		.75872	1.42528				T=9.15096			.76-6.97	3.05032	4.76:1.0
Halimeda tuna	4.19888	1.04348	1.90060	1.70664	.07012			T=8.91972			.07-4.20	1.78394	3.04:1.0
H. incrassata	8.55232	11.54928	36.87448	11.95456				T=68.93064			8.55-36.87	17.23266	.43:1.0
Codium													
Vaucheria		.51672			.00916			T=.52588			.009-.52	.26294	3.14:1.0

APPENDIX E-2.1

Canal IV, Sta. 14

* weights in G/m^2

Plant/ Algae	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep.10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Amphiroa rigida	.03872		.00684					T=.04556			.006-.04	.02278	.18:1.0
Gracilaria	.19460							T=.19460			.19	.19460	1.23:1.0
Eucheuma isiforme	.57128	1.45856	.05424					T=2.08408			.05-1.46	.69469	1.07:1.0
Ceramium		.37132						T=.37132			.37	.37132	.79:1.0
Polysiphonia howei		.55048						T=.55048			.55	.55048	1.56:1.0
P. sp.		.03440						T=.03440			.03	.03440	6.28:1.0
Oscillatoria													
Ulva	14.62984	1.40468	.00756	.05644				T=16.09852			.007-14.63	4.02463	.99:1.0

APPENDIX E-2.1

Canal IV, Sta. 14

* weights in G/m^2

Vascular Plants	Rep. 1*	Rep. 2*	Rep. 3*	Rep. 4*	Rep. 5*	Rep. 6*	Rep. 7*	Rep. 8*	Rep. 9*	Rep. 10*	Range	$\overline{X}$ (mean)	Ratio of Org.-Ash
Halodule wrightii	2.40188		.84392	.00344	1.58420			T=4.83344			.003-2.40	1.20836	.93:1.0
Thalassia testudinium		.05528	1.08008					T=1.13536			.05-1.08	.56768	.96:1.0
	48.72	29.67	59.16	27.41	9.73								
$\overline{X}$	34.94												
±	24.01												

APPENDIX E-2.2

Macrophyte biomass (g/m^2) for Canal III, Station 8, at Big Pine Key, Florida, August 1974.

Algae	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Rep. 8	Total	Range	$\overline{X}$	Ratio Org:Ash
Cladophora	0.19352	0.07664		7.25784	0.03532			0.03656	7.59988	0.035-7.258	1.51997	0.147:1
Batophora oerstedi	1.80884	0.04856	0.75268	1.41352	0.01036	0.12060	0.03888	6.22508	10.41852	0.010-6.22	1.30231	1.8:1
Acetabularia crenulata			0.00816		0.01984		0.00912		0.03712	0.008-0.019	0.012373	3:1
Caulerpa floridana		0.9844							0.9844		0.9844	24.5:1
Udotea							0.78028	0.08216	0.86244	0.082-0.780	0.43122	2.2:1
Penicillus dumetosus			1.55312		0.24032		2.01248	0.19464	4.00056	0.195-2.012	2.00028	1.8:1
Penicillus sp.	0.25408	1.05991				3.74624	5.22920		10.28943	0.254-5.23	5.144715	1.6:1
Halimeda incrassata				0.20396		0.74332			0.94829	0.204-0.743	0.474146	0.25:1
Codium					0.52784	1.68464			2.21248	0.528-1.68	1.10624	2.5:1
Halodule wrightii	0.1428	9.2434	7.44904	0.11048	11.17072	10.05232	10.87944	0.66848	49.71668	0.110-11.171	6.214585	8.7:1
Thalassia testudinium					0.02368				0.02368		0.02368	2.1:1
Syringodium filiforme		1.44104	0.24564		0.16044	1.54836		3.06880	6.46428	0.160-3.07	1.292856	10.7:1
Station mean	11.6938											
Standard deviation	5.228761											

APPENDIX E-2.2

Macrophyte biomass (g/m^2) for Canal III, Station 10, at Big Pine Key, Florida, August 1974.

Algae	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Rep. 8	Total	Range	$\overline{X}$	Ratio Org:Ash
Cladophora	1.042		0.02620		0.05264	0.12836	0.71412		1.96332	0.026-1.042	0.392664	1.25:1
Batophora oerstedi	0.40912	0.04836	0.10548	0.14444		0.03056	0.09548		0.83344	0.031-0.409	0.13891	3.7:1
Acetabularia crenulata	0.01108				0.00716				0.01824	0.007-0.011	0.00912	1.9:1
Caulerpa verticillata					0.03748				0.03748		0.03748	1.4:1
C. floridana	0.16976		1.2928		0.66116	0.02012			2.14384	0.020-1.29	1.07192	11.8:1
Udotea			1.77596						1.77596		1.77596	0.74:1
Penicillus dumetosus	1.71076				1.58896			4.45088	7.7506	1.59-4.45	2.58353	3.4:1
P. sp.			1.08612	0.25244		2.78188	0.03388		4.15432	0.034-2.78	1.03858	3.3:1
Polysiphonia sp.	0.01784								0.01784		0.01784	5.9:1
Halodule wrightii	12.41400	7.91408	4.27676		4.62288	10.30160	8.9164	3.93676	52.38248	3.94-12.4	7.48321	8.3:1
Thalassia testudinium			0.12064						0.12064		0.12064	8.5:1
Syringodium filiforme								2.50644	2.50644		2.50644	8.3:1

Station mean	9.18152
Standard deviation	4.6550

APPENDIX E-2.2

Macrophyte biomass (g/m^2) for Canal IV, Station 12, at Big Pine Key, Florida, August 1974.

Algae	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Total	Range	$\overline{X}$	Ratio Org:Ash
Rhizoclonium					0.0564			0.0564		0.0564	-11.6:1
Cladophora		0.26008		0.0406	0.210		0.1204	0.63108	0.041-0.260	0.15777	0.82:1
Batophora oerstedi	0.08312	0.20624	0.13536	0.20376	0.14624	0.441		1.21527	0.083-0.441	0.20262	1.6:1
Acetabularia crenulata					0.01736			0.01736		0.01736	1.2:1
Caulerpa verticillata			0.08128	0.04372	0.43684	0.1542	0.03056	0.7466	0.031-0.437	0.14932	1.2:1
C. floridana			0.00964			0.0264	0.009	0.04504	0.009-0.026	0.01501	3.5:1
Udotea						0.09776		0.09776		0.09776	2.2:1
Penicillus dumetosus			0.28880				0.52244	0.81124	0.289-0.522	0.40562	2.0:1
Halimeda tuna							0.03356	0.03356		0.03356	839:1
H. incrassata	0.68396			0.10368	0.46564	0.05696	0.42068	1.73092	0.057-0.684	0.34618	0.48:1
Oscillatoria			0.01872					0.01872		0.01872	15.6:1
Halodule wrightii			0.01244	0.0874	0.05088	0.0866		0.23732	0.012-0.087	0.05933	3.0:1
Thalassia testudinium		0.08104	0.00513	0.09800		0.20332	0.0158	0.40334	0.005-0.203	0.08067	2.3:1
Station mean	0.8635										
Standard deviation	0.3375										

APPENDIX E-2.2

Macrophyte biomass (g/m^2) for Canal IV, Station 14, at Big Pine Key, Florida, August 1974.

Algae	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Total	Range	$\bar{X}$	Ratio Org:Ash
Cladophora		0.02828	0.11708	0.21696	0.01504	0.10976	0.37104	0.85816	0.015-0.371	0.14303	0.92:1
Batophora oerstedi	0.03856		0.07332	0.13304	0.01184	0.01584	0.23484	0.50744	0.012-0.235	0.08457	2.5:1
Valonia	0.38956						0.014	0.40356	0.014-0.389	0.20178	1.2:1
Caulerpa verticillata		0.00236						0.00236		0.00236	1.4:1
C. floridana	0.0086							0.0086		0.0086	1.7:1
Penicillus dumetosus			4.07576	3.66104	4.75056		0.04908	12.53644	0.049-4.75	3.13411	2.6:1
P. sp.	0.04308	2.51064						2.55372	0.043-2.51	1.27686	2.1:1
Halimeda incrassata	0.34724	0.09808	1.08716	0.07508	13.5074	4.72852	0.0522	19.89568	0.052-13.5	2.84224	0.46:1
Eucheuma isiforme							0.22052	0.22052		0.22052	1.3:1
Halodule wrightii	1.08464	5.1828	9.84468	5.5602	0.03524		0.00936	21.71692	0.009-9.84	3.61949	8.8:1
Thalassia testudinium	4.80184				0.05756	0.1116		4.971	0.058-4.80	1.657	6.7:1
Syringodium filiforme	0.1128		0.05268					0.16548	0.053-0.113	0.08274	0.22:1
Station mean	9.1199										
Standard deviation	5.9791										

Appendix E-2.3
Macrophyte Associations* in Big Pine Key, Florida
November 1973

Species	Canal III Stations			Reference Stations	Canal IV Stations		
	8	9	10	11	12	13	14
Penicillus dumetosus	X				0	0	X
Batophora oerstedi	X	0	0		0	0	0
Halodule wrightii	X	X	X	0	0	0	0
Oscillatoria spp.	X	X	0		0		
Penicillus sp.	0	X	X	0	0	0	0
Cladophora	0	X	0	0	X	0	0
Codium			X				
Caulerpa verticillata	0			X	X	X	0
Halimeda tuna				X	0	X	0
Halimeda incrassata	0		0	X	X	X	X
Eucheuma isiforme	0			X		0	0
Caulerpa floridana	0		0	0	X	X	X
Ulva	0	0		0	0	0	X

X = Dominant
0 = present

* The above species were in the top four dominants (X) of at least one replicate before they were included in the list.

APPENDIX E-2.4

Macrophyte Associations in Big Pine Key, Florida August 1974

Species*	Canal III Stations		Canal IV Stations	
	8	10	12	14
Penicillus dumetosus	0	X	X	X
Batophora oerstedi	X	0	X	0
Halodule wrightii	X	X	0	X
Oscillatoria sp.			0	
Penicillus sp.	X	X		0
Cladophora sp.	X	0	0	0
Codium sp.	0			
Caulerpa verticillata		0	X	0
Halimeda tuna			0	
Halimeda incrassata	0		X	X
Syringodium filiforme	0	X		0
Caulerpa floridana	0	0	0	0
Udotea sp.	0	0	0	
Thalassia testudinium	0	0	0	X

X = Dominant
0 = Present

*Species listed were in the top four dominants (X) of at least one replicate before they were included in the list.

Appendix E-3.1. Periphyton Clump Counts ($\#/mm^2$) Punta Gorda, Florida
November 1973
Number of Organisms

Categories	CANAL I														REFERENCE STATION 4		
	STATIONS																
	3 (mouth)							1 (end)									
	Days Incubation							Days Incubation							Days		
	4	6	10	13	19	23	29	4	6	10	13	19	23	29	4	6	10
Coccoid blue-green																	
Filamentous blue-green																	
Coccoid green																	
filamentous green					P*	P	P					P	P	P			
Green flagellates																	
Other coccoid greens																	
Other pigmented flagellates																	
Protozoa					18	5	5					15	5	7			
Diatoms																	
centric	1	1	1	2	3	5	11	1	1	1	19	28	53	68	1	1	8
Pennate	17	100	312	747	767	738	833	27	137	231	506	949	659	1014	11	25	972
Total Algae	18	101	313	749	788	748	849	28	138	232	525	991	717	1089	12	26	980

*P = present but not counted

Appendix E-3.1
Periphyton Clump Counts (#/mm^2) Punta Gorda, Florida
November 11, 1973
Number of Organisms

Categories	CANAL II													
	STATION													
	7 (mouth)							5 (end)						
	Days Incubation							Days Incubation						
	4	6	10	13	19	23	29	4	6	10	13	19	23	29
Coccoid blue-green														
Filamentous blue-green									18					
Coccoid Green														
Filamentous Green					P*	P	P							
Green Flagellates														
Other coccoid greens														
Other pigmented flagellates														
Protozoa														
Diatoms														
centric	1	2	0	1	2	12	9	1	15	129	183	265	110	364
Pennates	81	283	239	414	188	813	564	80	726	937	467	480	408	642
Total Algae	82	285	239	415	190	825	573	81	741	1066	650	745	578	1006

P* = Present but not counted

APPENDIX E-3.2

Periphyton Clump Counts (#/mm^2) Big Pine Key, Florida
November 1973
Number of Organisms

Categories	CANALS								
	IV					III			
	STATIONS								
	12					8			
	REPLICATE NUMBER					REPLICATE NUMBER			
	1	2	3	4	5	1	2	3	4
Coccoid blue-green	2		2		P*				
Filamentous blue-green									
Coccoid green									
Filamentous green									
Green flagellates	9	11	7	2	7		P		
Coccoid other									
Pigmented flagellates									
Protozoa									
Diatoms									
Centric	21	18	14	5	5	3	2	2	
Pennate	703	830	796	585	865	708	699	662	
Total	735	859	819	592	877	711	701	664	

P = Present but not counted.

Appendix E-3.3 Periphyton Chlorophyll a Concentrations (mg/m^2), Punta Gorda, FL November 11, 1973

Canal	Station	Days	$\overline{X}$	S*
I	1	4	0.4	0.1
		6	3.7	0.8
		10	8.0	0.1
		13	4.4	1.0
		19	23.8	1.0
		23	43.9	8.6
		29	43.1	4.7
I	3	4	0.3	0.1
		6	2.4	0.2
		10	9.7	0.5
		13	10.7	1.2
		19	46.8	5.0
		23	66.7	12.7
		29	72.0	53.0
II	5	4	1.0	0.1
		6	16.0	2.3
		10	40.2	0.7
		13	67.0	17.6
		19	77.7	15.9
		23	28.7	5.8
		29	47.1	12.4
II	7	4	0.6	0.1
		6	6.1	0.6
		10	4.2	1.4
		13	44.5	8.6
		19	105.2	13.1
		23	110.1	49.5
		29	149.3	40.0
Reference		4	0.025	0.024
		6	1.0	0.3
		10	45.3	3.9

*S = Standard deviation

APPENDIX E-3.4

Periphyton Organic Matter (G/m^2) Values
Punta Gorda, Florida, November 1973

Canal	Station	Days	$\overline{X}$	S
I	1	4	.2370	.1531
		6	1.042	.1657
		10	5.390	2.719
		13	6.244	.4196
		19	10.789	2.013
		23	13.701	3.309
		29	20.779	4.008
I	3	4	.1770	.1400
		6	.8187	.3506
		10	2.050	.1845
		13	1.060	.8107
		19	5.474	4.463
		23	6.323	1.854
		29	7.563	.8665
II	5	4	.6487	.5120
		6	3.192	.2960
		10	9.702	3.202
		13	11.728	3.423
		19	10.514	2.923
		23	6.589	3.183
		29	8.719	1.145
II	7	4	.5123	.3662
		6	.6530	.3591
		10	.6937	.2207
		13	1.940	2.899
		19	17.302	3.135
		23	21.852	16.457
		29	22.135	5.110
Reference		4	.0747	.0502
		6	.3043	.0782
		10	4.172	3.108

Appendix E-3.5 Periphyton Autotrophic Index Values, Punta Gorda, Florida
November 27, 1973

			Autotrophic Index	
Canal	Station	Days	X	S*
I	1	4	359.22	257.32
		6	219.09	79.08
		10	255.26	24.68
		13	243.11	173.96
I	3	4	770.83	473.73
		6	439.45	46.98
		10	549.52	247.90
		13	421.23	276.67
		19	229.05	19.33
		23	205.02	23.76
		29	697.37	838.07
		19	230.66	185.22
		23	142.28	13.33
		29	175.72	9.29
II	5	4	647.25	477.90
		6	202.16	35.75
		10	241.52	81.28
		13	174.53	9.53
		19	134.06	11.37
		23	240.99	147.63
		29	189.91	32.91
II	7	4	851.65	598.45
		6	107.57	56.50
		10	171.45	38.60
		13	39.24	57.95
		19	164.46	[illegible]
		23	181.97	58.50
		29	153.84	50.00
Reference		4	2746.90	803.07
		6	317.37	127.04
		10	87.53	57.00

*S = Standard deviation

Appendix E-4.1 Phytoplankton Chlorophyll-a Concentrations (mg/m^3)
Punta Gorda and Big Pine Key, Florida
November 1973

Canal	Station	Mean	S*	Canal	S*	Mean
I	1	16	9			
I	2	14	4	I	4.72	12
I	3	7	4			
Reference	4	6	2			
II	5	5	2			
II	6	9	6	II	2.3	6
II	7	5	2			
II	8	.21	.10			
II	9	.18	.04	III	.02	18
II	10	.16	.06			
Reference	11	.19	.06			
IV	12	.90	.32			
IV	13	1.02	.57	IV	.15	87
IV	14	.71	.32			
Special Stations	C	5.5	.75			
	D	12	1.38			
	E	13	1.04			
	F	.92	.36			
	G	1.12	.29			
	H	.30	.01			
	I	.19	.01			

*S = Standard deviation

Appendix E-4.2 Average Total Live Phytoplankton - Concentrations (#/ml) Punta Gorda and Big Pine Key, Florida November 1973

Canal	Station	Mean	S*
I	1	2067	454
I	2	1766	239
I	3	838	350
Reference	4	315	122
II	5	329	22
II	6	1045	425
II	7	556	192
III	8	76	36
III	9	57	20
III	10	55	27
Reference	11	76	27
IV	12	112	20
IV	13	49	13
IV	14	69	26

*S = Standard Deviation

APPENDIX E-5

Visible Light Profiles in Terms of Percent Transmission and Light Extinction Coefficients, Finger-fill Canal Study, Big Pine Key, Florida, November 1973.

Station 8			Station 9			Station 10			Station 11			Station 12			Station 13			Station 14		
Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}
									Run 1	0900	Hours									
0.0	100	---	0.0	100	---	0.0	10.	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---
0.5	60	0.308	0.5	63	0.349	0.5	62	0.381	0.5	55	0.392	0.5	68	0.325	0.5	58	0.514	0.5	57	0.498
1.0	49	0.356	1.0	50	0.406	1.0	48	0.446	1.0	45	0.484	1.0	55	0.375	1.0	45	0.511	1.0	45	0.484
1.5	40	0.373	1.5	40	0.419	1.5	40	0.419	1.5	37	0.453	1.5	48	0.340	1.5	38	0.453	1.5	34	0.509
2.0	32	0.391	2.0	33	0.410	2.0	32	0.426	2.0	32	0.412	2.0	38	0.372	2.0	29	0.475	2.0	25	0.536
2.5	27	0.381	2.5	25	0.439	2.5	26	0.424	2.5	27	0.398	2.5	35	0.331	2.2	27	0.464	2.5	19	0.538
2.7	25	0.381	2.7	23	0.438	2.7	24	0.422	3.0	19	0.449									
Mean	K^{-m}	0.365			0.409			0.420			0.431			0.349			0.484			0.513

Visible Light Profiles in Terms of Percent Transmission and Light Extinction Coefficients, Finger-fill Canal Study, Punta Gorda, Florida, November 1973.

Station 1			Station 2			Station 3			Station 4			Station 5			Station 6			Station 7		
Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}	Depth (m)	% Trans	K^{-m}
									Run 1	1000	Hours									
0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---
0.5	28	2.010	0.5	25	2.197	0.5	25	1.911	0.5	32	1.833	0.5	63	0.713	0.5	48	1.021	0.5	32	1.954
1.0	10	2.079	1.0	8	2.238	1.0	12	1.689	0.7	22	1.844	1.0	21	1.455	1.0	18	1.492	1.0	13	1.878
1.5	3.6	2.039	1.5	2.5	2.267							1.5	10	1.465	1.5	9	1.457			
1.7	2.5	2.039	2.0	0.6	2.414							1.6	8	1.513						
			2.6	0.4	2.109															
Mean	K^{-m}	2.042			2.245			1.800			1.838			1.286			1.323			1.916
									Run 2	1500	Hours									
0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---	0.0	100	---
0.5	24	2.279	0.5	25	2.059	0.5	27	1.946	0.5	38	1.438	0.5	47	1.113	0.5	31	1.427	0.5	32	1.954
1.0	8.5	2.177	1.0	8	2.169	1.0	10	1.962	1.0	20	1.253	1.0	14.5	1.173	1.0	18	1.467	1.0	13	1.878
1.5	2.5	2.267	1.5	3	2.010							1.5	6	1.174	1.5	8	1.492			
2.0	0.9	2.211	2.0	1	2.124										1.6	7.5	1.439			
			2.1	0.7	2.193															
Mean	K^{-m}	2.233			2.111			1.954			1.34			1.153			1.456			1.916

*U.S. GOVERNMENT PRINTING OFFICE: 1977-741-396/4267 Region No. 4